

*Machine  
and Tool*



# BLUE BOOK

ESTABLISHED 1906

**MAY 1953**

**A Dollar and Cents Evaluation  
of Pneumatic Tools**

**Machining Detroit Gear's  
Automatic Transmission**

**Machining the Atomic Cannon**

**Lost Minute Washington News**

**"Kew-How" Reference Sheets**

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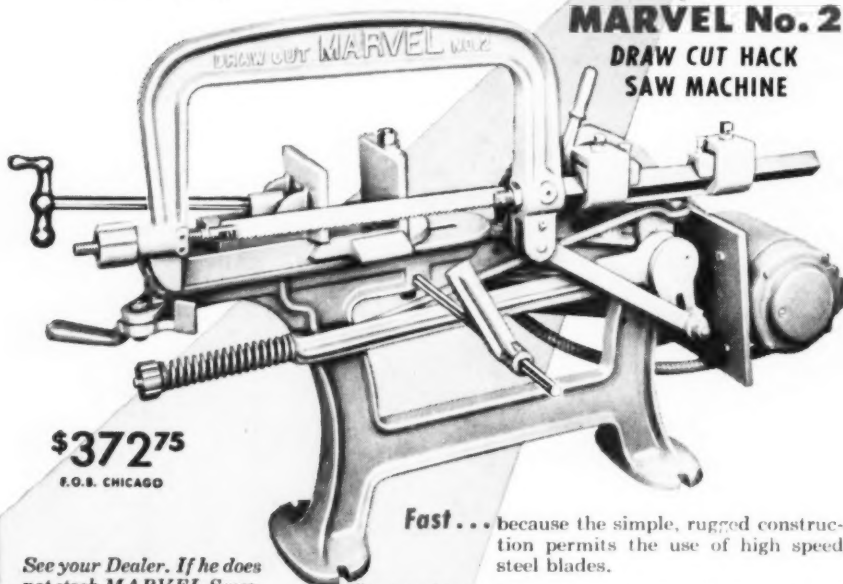
**Special Report on  
TOOL and  
CUTTER GRINDERS**

# For... General-Purpose Sawing

FAST-ACCURATE-ECONOMICAL-DRY CUTTING

Capacity up to 8" round

Improved  
**MARVEL No. 2**  
DRAW CUT HACK  
SAW MACHINE



**\$372<sup>75</sup>**

F.O.B. CHICAGO

*See your Dealer. If he does not stock MARVEL Saws, he can get them quickly. Or simply write us for literature and delivery. When buying hack saw blades insist that your dealer furnishes genuine MARVEL High-Speed-Edge Hack Saw Blades—they are unbreakable!*

**Fast...** because the simple, rugged construction permits the use of high speed steel blades.

**Accurate...** because the improved Saw Frame with clamping type blade holders holds the blade in perfect alignment and proper tension.

**Economical...** because of its automatic relief on the return stroke, the blade will last and last and last.

**Dry Cutting...** because modern high speed steel blades will operate efficiently at 60 strokes per minute without a coolant.



ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Ave. • CHICAGO 39, ILL



**KNIGHT'S**

# *Power Feed* **ROTARY TABLES**

- **Completely Self-Contained Motor-Driven Units**
- **No Set-Up Time — Just Plug Into Any Electric Outlet**

Can be used on any milling machine without additional or special equipment. Set-up time is completely eliminated.

Use them for Automatic Cycle Milling . . . Cam Milling . . . Face Milling . . . as an Automatic Revolving Fixture . . . and for other special work to save costly time and labor.

**20" Model:** 18 quick-feed changes, 1½" to 52", or 3" to 108".

**42" Model:** Infinite variable feed. Automatic positioning. Table can be increased to 72" with subplates.



**W. B. KNIGHT MACHINERY CO.**  
3924 WEST PINE BOULEVARD  
ST. LOUIS 8, MISSOURI

**fast, low-cost  
ROTARY MILLING &  
INDEXING  
on any milling machine!**



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Send information on Power-Feed Rotary Tables

NAME .....

TITLE .....

☐ Also send details on Knight Milling Machines

# BENCO

*better*

**COLLETS**



Standard Master Collet  
1/2" Lat. No. 2, 3, 4, 5, 6

Precision engineering, unsurpassed construction and rigid inspection assure dependable, constant service from every Benco Collet. They help keep your machines working without interruption, reducing costs and increasing output. You can always get better results from Benco Collets under the toughest operating conditions. Leading shops continually select more Benco Collets because of their outstanding quality and economy. Order your requirements today. The Benco design master collet is standard equipment on National Acme machines.

*Always Better Constructed  
Accurate Benco Collets, Pushers and Pads*

**BENCO COLLET MANUFACTURING COMPANY**  
CLEVELAND 14, OHIO

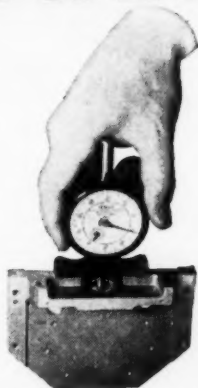
# Why Fiddle Around with **OLD-FASHIONED** Depth Gages?

A MAN HAS TO DEVELOP A PRETTY KEEN SENSE OF TOUCH to use a flush pin gage with even reasonable accuracy. And such gages don't show any *trend* when the dimension is getting out-of-control until the operator is producing wrong depths. Micrometer depth gages are slow — they're not as fast, positive or accurate as Dial Indicator Depth Gages.

Federal offers several stock types of Depth Gages and will design and build other types to suit your particular requirements. Tell us what you need and we'll show you something to fit that need. Write, giving us the details. **FEDERAL PRODUCTS CORPORATION,** 1255 Eddy St., Providence 1, R. I.



Largest manufacturer devoted exclusively to designing and manufacturing all types of **DIMENSIONAL INDICATING GAGES**



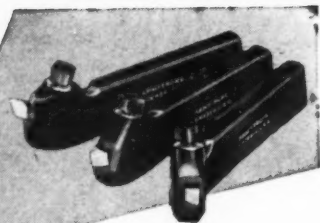
A regular catalog type of portable depth gage which can be had with various lengths of contact points, either radius or pin-pointed, and either self-locating or push-down spindle. (Model 75P).



A bench type gage having a multitude of applications. Table and Indicator are pitched at a 15° angle for greater visibility. The Dial Indicator can be quickly adjusted vertically to suit depth of workpiece dimension (Model 75 B-1).



# ARMSTRONG TOOL HOLDERS



answer both . . .

1. The problem of lowering costs
2. The problem of increasing output

By providing permanent, multi-purpose, inexpensive ARMSTRONG TOOL HOLDERS that use cutters or bits that are quickly ground from standard high speed shapes (Saving: All Forging, 70% Grinding and 90% High Speed Steel), the Armstrong System of Tool Holders will reduce your tool cost to an absolute minimum.

By providing stronger, more efficient tools, carefully developed for each operation, as well as ARMSTRONG High Speed Steel, ARMALLOY Cast Alloy Cutter Bits or Armide Carbide-Tipped Cutters as required for each job, ARMSTRONG TOOL HOLDERS permit greatly increased speeds and feeds, enable you to increase the hourly output of every lathe, planer, slotter, shaper, turret lathe and screw machine.

There is no surer way to lower costs and increase output, than to use the correct ARMSTRONG TOOL HOLDER for each operation on all machines.

## ARMSTRONG BROS. TOOL CO.

*"The Tool Holder People"*

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Pacific Coast Whse. & Sales Office: San Francisco 3, Calif.



# Machine and Tool BLUE BOOK

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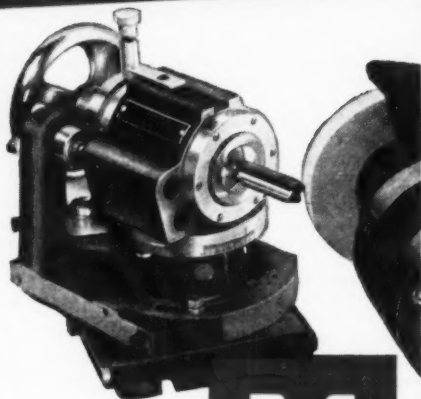
RELIEVES TAPS • RELIEVES COUNTERBORES • RELIEVES SPHERICAL CUTTERS

RELIEVES PROFILE MILLS • RELIEVES REAMERS • RELIEVES STEP DRILLS

*What a relief!*  
...RADIAL relief!

**FOR MORE CUTS PER GRIND and BETTER CUTS — SHARPEN STRAIGHT and SPIRAL TOOLS WITH D • S**

By actual user experience, radially relieved tools have outlasted tools with standard angular relief by as much as 5 times. They cut freer and better. D.S. is readily set up and radial relief can be produced by any good grinder hand without special experience. Hundreds of these fixtures are now in use.



**D • S  
RADIAL  
RELIEF  
GRINDER**

These are relieved  
commercially tool-  
ing all possible  
metal cutting  
edge for  
support



any amount of  
length, width  
and depth of  
relief can be  
ground on this  
grinder



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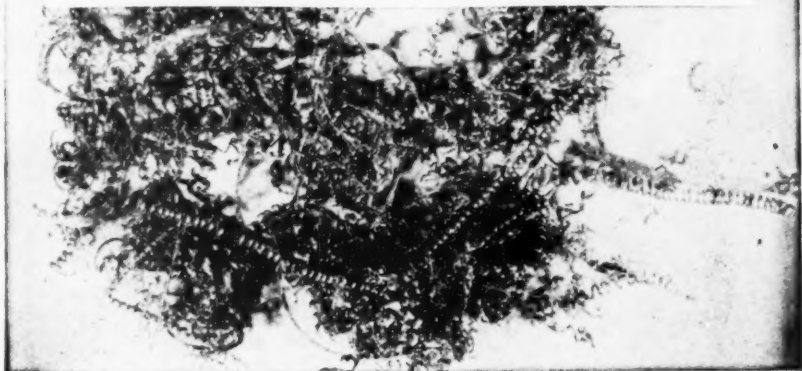


**D • S GRINDER DIVISION  
Royal Oak Tool & Machine Co.  
Stephenson Hyway • Royal Oak, Mich.**

RELIEVES BORING BARS • RELIEVES HOLLOW MILLS



**Believe it or not . . .**  
**THESE ARE HONING CHIPS**



**FULMER**

**HONING MACHINES REMOVE  
METAL SO RAPIDLY THAT**

**FULMER COMPLETE  
HONING EQUIPMENT  
Has EVERYTHING  
YOU NEED IN ONE  
"PACKAGE"—Honing  
Machines—Tools—  
Fixtures**

. . .

**WRITE  
for bulletin on  
HONING**

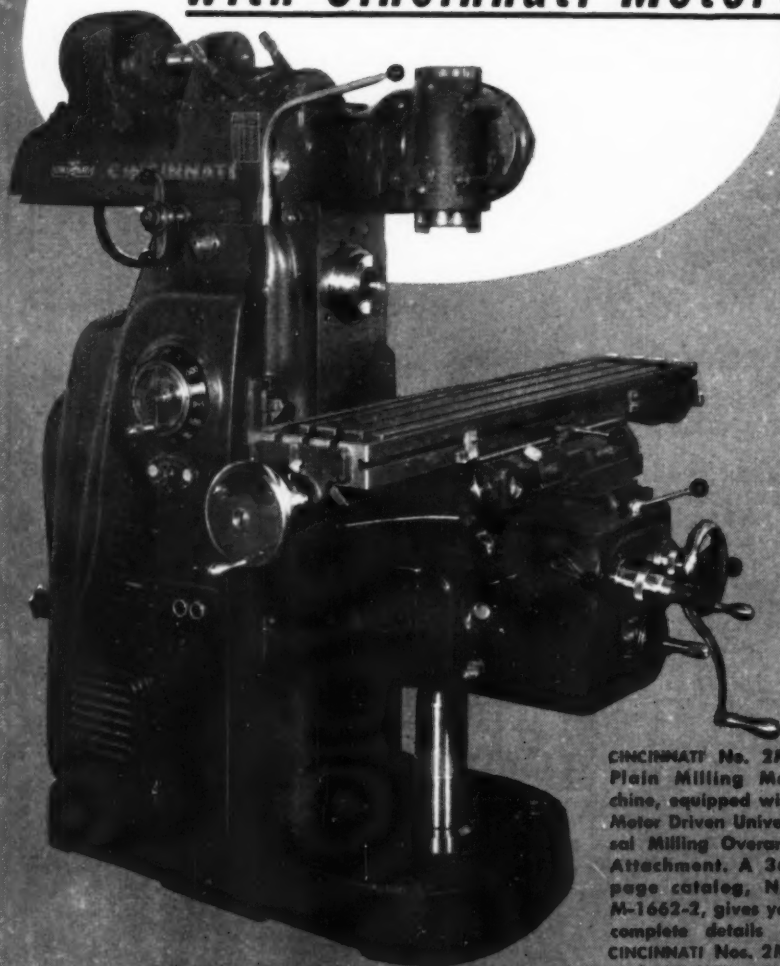
**ONLY ROUGH BORING OR DRILLING  
IS NEEDED BEFORE HONING**

Think of the terrific savings in time and labor! In Fulmer Honing Machines the spindle rotating and reciprocating mechanism provide honing of geometrical accuracy and any desired degree of smoothness. The rapid cutting action removes large amounts of material quickly, as shown in the photograph.

**C. ALLEN FULMER CO.**

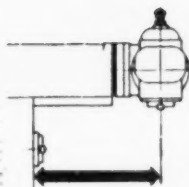
**1242  
FIRST  
NATIONAL  
BANK BLDG.  
CINCINNATI  
2, OHIO**

**Increasing  
the job possibilities  
*with Cincinnati Motor***



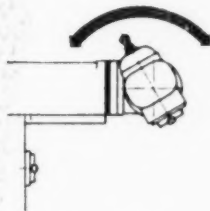
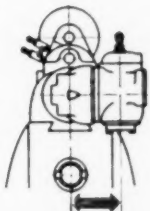
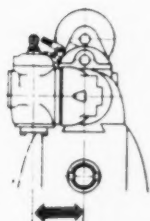
CINCINNATI No. 2MI  
Plain Milling Ma-  
chine, equipped with  
Motor Driven Uni-  
versal Milling Over-  
arm Attachment. A 36-  
page catalog, No.  
M-1662-2, gives you  
complete details of  
CINCINNATI Nos. 2MI  
and 2MI Milling Ma-  
chines.

These drawings illustrate how CINCINNATI Motor Driven Universal Milling Overarm Attachments increase the range and versatility of CINCINNATI knee-type milling machines. Complete information in publication No. M-1661-1.



## **Driven Overarm Attachment**

How many times have you needed a little extra range or extra versatility for a milling setup? Just think how much it would have saved! You can get all the extra range and versatility you will need on your CINCINNATI knee-type milling machines by equipping them with Motor Driven Overarm Attachments. ¶ Consider the CINCINNATI No. 2MI, for example. Of itself, it offers a host of advantages: convenient and easy speed change with one lever . . . a similar feature at the front of the knee for feed changes . . . 16 spindle speeds, 60 to 1 ratio . . . 16 feeds, 120 to 1 ratio . . . unit construction for low-cost maintenance. To these advantages and, many others, add the extra range and versatility offered by the Motor Driven Overarm Attachment, and you have a toolroom miller that can handle any job. ¶ A few examples of the ways in which these self-contained attachments increase the job possibilities of CINCINNATI Milling Machines are illustrated here. There are two sizes, 2 hp for 2ML, 2MI and Dial Types; 5 hp for Dial Types and High Power and Dual Power Dial Types. You may obtain more information by writing for publication No. M-1661-1.



**THE CINCINNATI MILLING MACHINE CO.**  
**CINCINNATI 9, OHIO**

# **CINCINNATI**

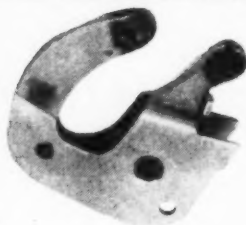


**MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING  
MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES  
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID**



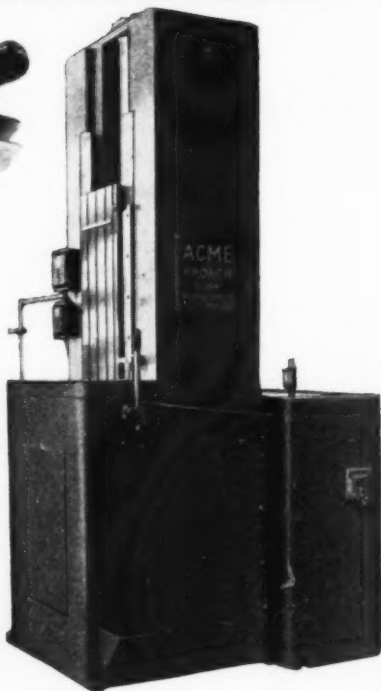
# DESIGNEERED\*

HOW would you finish the internal form on the special latch illustrated in photograph at a high production rate?



WHEN our customer asked us for equipment for finishing the internal form of the special latch illustrated the ACME single slide surface machine proved the perfect answer. By using inexpensive "Designeered"\* tooling, highly satisfactory results were obtained.

ACME manufactures ALL TYPES of broaching machines and allied equipment under the supervision of men in this field since the inception of the process!



\* **DESIGNEERED** ... An ABC word coined to describe the creative design-engineering inherent in every product made by Acme Broach Corp.

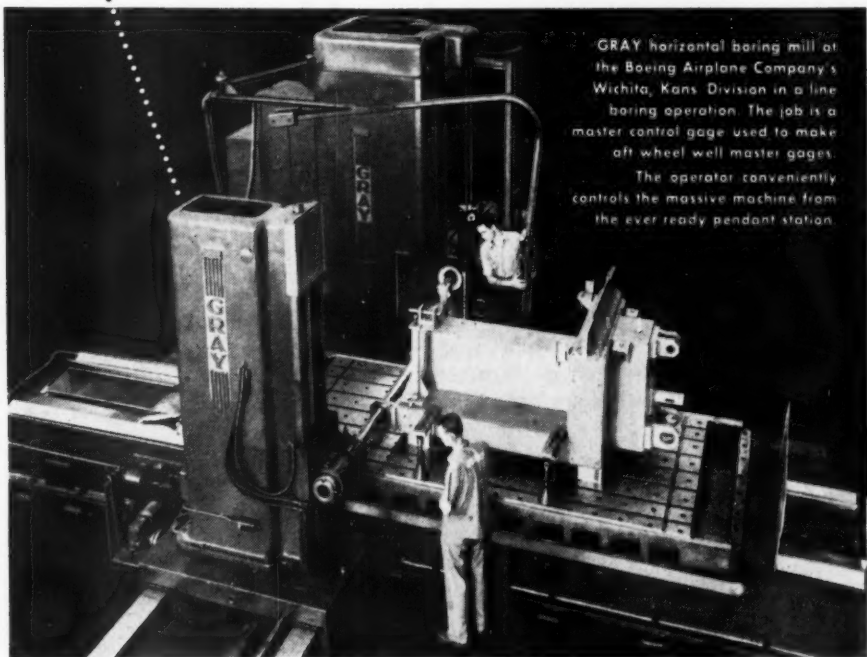
*Shown above is the ACME six ton, thirty-six inch, single slide surface broaching machine.*

# ACME BROACH CORP.

MILAN, MICHIGAN

# BATTING .000 IS TOPS IN THIS LEAGUE

That's why Boeing uses a GRAY 6" BORING MILL. The ultimate in precision is needed to line bore the master control gages that will be used to make master gages for B-47 Stratojet Bombers. Work of this type must be absolutely right—hitting .000" accurately and quickly is imperative—that's why a GRAY was the logical choice. GRAY's high precision, convenience, and modern speed is saving production dollars in hundreds of shops. Whatever your requirements—a GRAY will do the job—better—faster.



GRAY horizontal boring mill at the Boeing Airplane Company's Wichita, Kans. Division in a line boring operation. The job is a master control gage used to make aft wheel well master gages.

The operator conveniently controls the massive machine from the ever ready pendant station.

Write today. Get  
the story on  
**HIGH**  
low cost  
**PRODUCTION**

Dept. D

*The G.A.* **GRAY** *Company*

planers • milling planers  
planer type milling machines  
horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.

SOLD IN CANADA BY UPTON, BRADSHAW AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

# POWERFUL FLEXIBLE SHAFT MACHINES



AN INDUSTRIAL  
MACHINE FOR  
INDUSTRIAL USERS

TAPPING ATTACHMENTS • TAPS • FLEXIBLE SHAFTS  
AND MACHINES • ROTARY FILES • TUNGSTEN CARBIDE  
REAMERS AND MILLS • DRILLS • BORING BITS

## Jarvis POWER TOOLS

by  
*Jarvis*

Do Your Jobs

**EASIER--FASTER--  
MORE ECONOMICALLY!**

Whether your operations call for GRIND-  
ING, CUTTING, BUFFING, SANDING or  
ROTARY FILING, Jarvis Flexible Shaft  
Machines are available in BENCH, FLOOR  
or OVERHEAD Types—in Single or Mul-  
tiple Speeds to suit your Individual  
Requirements.

A Jarvis Factory Trained Rep-  
resentative will be pleased to  
assist you in selecting models  
best suited to your use. Com-  
plete catalog upon request.



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MIDDLETOWN IN CONNECTICUT



# ANNOUNCING 4 NEW CUTTING OILS!

## 2 DUAL-PURPOSE OILS (lubrication and cutting)

**SUNICUT 11-S** for medium duty on automatic screw machines

**SUNICUT 209-S** for heavy duty on automatic screw machines

## 2 SINGLE-PURPOSE OILS (cutting only)

**SUNICUT 102-S** for heavy duty on automatic screw machines

**SUNICUT 110-S** for heavy duty service in broaching, threading, gear cutting, heading and similar applications



All four oils keep parts and tools cooler, help maintain closer work tolerances, permit longer runs between tool dressings. All are odorless and light in color. In addition, Sunicut 11-S and 209-S have high lubricating value and are nonstaining.

For your copies of the technical bulletins describing these new oils, call the nearest Sun office or write **SUN OIL COMPANY**, Philadelphia 3, Pa., Dept. MT-5.

**INDUSTRIAL PRODUCTS DEPARTMENT  
SUN OIL COMPANY**



**PHILADELPHIA 3, PA. ♦ SUN OIL COMPANY LTD., TORONTO & MONTREAL**

# *New*

## **VAN NORMAN 418**

### **CYLINDRICAL GRINDER**

*Completely Engineered*

**to Give Heavy Machine Performance**

**New Design Permits Economical  
Close-Tolerance Short Run or Production  
Grinding of Small Parts**

Here's the new Van Norman 418 Cylindrical Grinder that is cutting costs in grinding of small parts.

Especially developed for fast plunge or traverse grinding, it is particularly adaptable for toolrooms, job shops, or plants where work is usually in small or medium runs.

#### **Compare these important Van Norman features...**

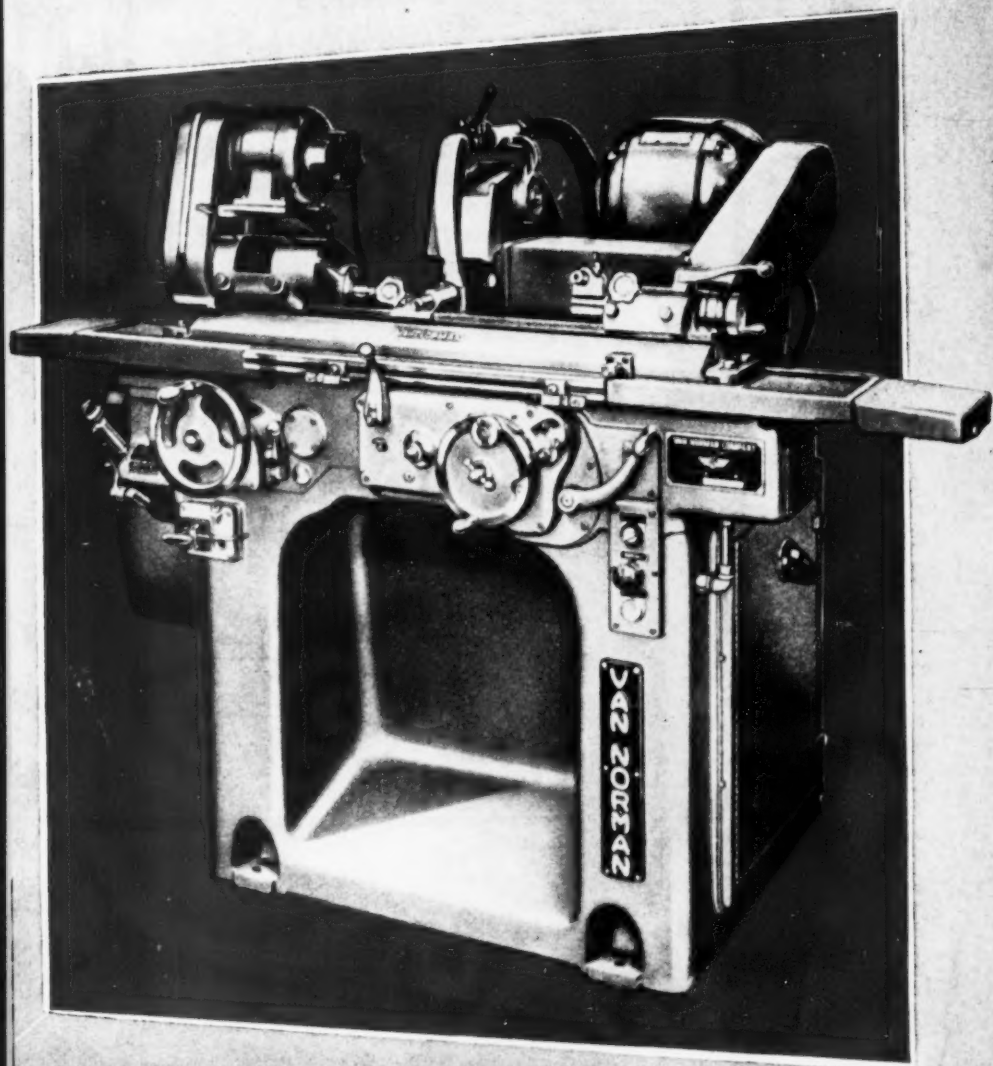
- Pope wheel spindle engineered with extra-large SKF double row cylindrical roller bearings assures smooth, chatter-free finish and long operating life.
- Heavy-duty headstock and footstock for rigidity, accuracy and smooth grinding.
- Floor space needed, only 43½" x 79¼".
- Single lever control for rapid plunge and traverse grinding.
- Automatic starting and stopping of headstock and table traverse.
- Controls are conveniently grouped in front of grinder for ease of operation and maximum operator efficiency.

Find out for yourself how the Van Norman 418 Cylindrical Grinder reduces over-all work completion time . . . cuts costs of grinding small parts. Write for Catalog, today. Especially inquire about the price . . . it's exceptionally low for a quality grinder.

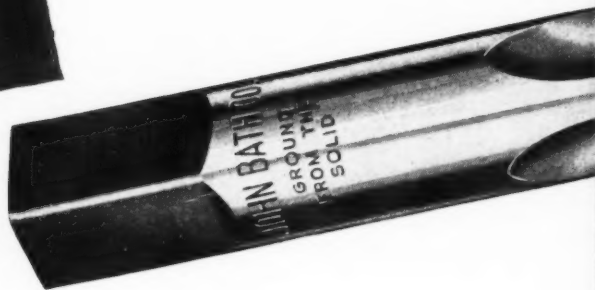
**VAN NORMAN COMPANY**  
SPRINGFIELD 7, MASSACHUSETTS

*Manufacturers of Precision Grinders Since 1912*

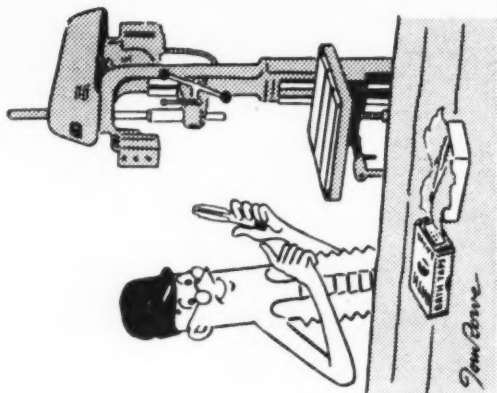




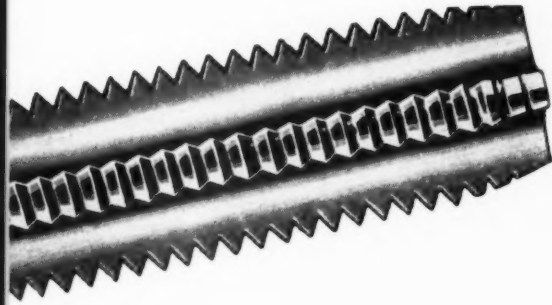
# TAP-ODDITIES



On a windy day, Production Pete  
Is always making "checks" —  
On the contour of a pair of shanks  
Without the aid of "specs".



And when it comes to a production run  
Where "specs" must play no pranks,  
Pete picks Bath Taps for contour —  
Admires their perfect shanks.



The manufacture of Bath "ground from the solid" Taps, has been perfected to take advantage of the latest technical methods, equipment and quality control — producing working tools of uniform structure and in perfect concentricity for precision threading. This means everything must be in line — even to the shank.

Flute contour is important, too. At the Bath plant, flutes are ground on centers in perfect alignment — and, after polishing, assure a refined cutting edge — all the way to the crests of the teeth. Getting full cutting benefit means better threads — especially when you know everything is centered with the axis of the tap.

For "true" value — "in line" with long wear — insist on BATH TAPS for BETTER THREADS.

INSIST ON BATH TAPS  
— PROFIT BY THEIR  
PLUS—PERFORMANCE



PLUG AND RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

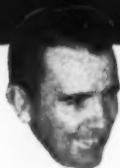
# JOHN

# BATH CO.

INCORPORATED

14 Grafton St., Worcester, Mass.

"It all adds up to this:  
**MORSE ELECTROLIZED**  
 are the least expensive  
 tools you can buy!"



The tool-crib boss never loses a chance to remind the works manager that: "Every new shipment of Morse Cutting Tools that comes into the plant *pays another bonus in plus-production!*"

That's right. For what Morse Tools *really* cut are *costs* . . . by cutting cleaner and faster . . . by staying on the job longer. And then, of course, to go even further and get the unmatched maximum in tool-life, *specify* Morse Electrolized Tools.

Whatever you need, in standard or special-purpose tools contact your Morse-Franchised Distributor. He'll work out the exact specifications that will give you top performance *on your particular job*, at lowest cost. He has the know-how and the assistance of Morse Engineers to solve any tooling problem.

**MORSE TWIST DRILL & MACHINE COMPANY**  
 NEW BEDFORD, MASS.

(Division of VAN NORMAN CO.)

Warehouses in New York, Chicago, Detroit, Houston, San Francisco



**TOOLS**

POSITIVELY NO ADMITTANCE



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**Cutting Tools**

...buy them by phone from  
your Morse-Franchised  
Distributor and save  
ordering time



*All Hands are  
"TOP HANDS"*

...when they work with **SIMONDS**  
**"RED END" Hacksaw Blades**

It's fast, easy cutting on any material . . . when the hand-frame holds the right "Red End" Blade for the job. That's why those who know, insist on the blade with this famous trade-mark.

On the economy side, Simonds "Red End" Blades are uniformly hardened for better cutting performance and lowest cutting costs. What's more, teeth are accurately milled and precision-set . . . for straighter

cutting and longer life. And Simonds offers a choice of three types of blades — Standard, Molybdenum or High Speed Steel — Hard Edge or All Hard — to provide a "right" blade for your job.

Get delivery from stock from your Simonds Distributor.

For PROMPT DELIVERY and PERSONAL SERVICE  
... call your INDUSTRIAL DISTRIBUTOR

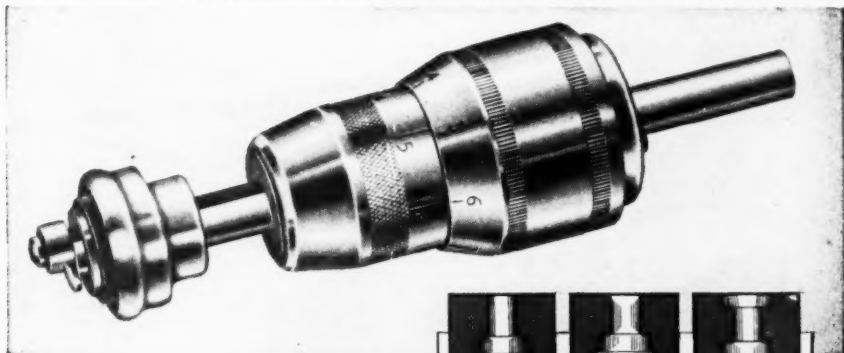


Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.  
Simonds Distributors: Simonds Steel Mills, Lockport, N. Y.; Simonds Abrasive Co., Philadelphia, Pa., and Arvida, Que., Canada

## Waldes Truarc Internal Grooving Tool

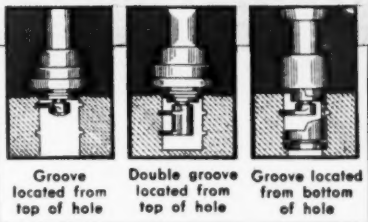
for precision cutting of internal grooves  
in bores and housings

**FAST! ECONOMICAL! NEEDS NO SKILLED LABOR!**



Internal groove-cutting becomes the simplest of operations with Waldes Truarc Internal Grooving Tool. Easy to adjust—easy to operate...readily adaptable to individual requirements.

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressure—especially suitable for unskilled operators.



The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

Write now for descriptive brochure giving mechanical details,  
cutting sizes...extra features



**WALDES**

**TRUARC**

Reg. U.S. Pat. Off.

**GROOVING TOOL**

WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N. Y.

Waldes Truarc Grooving Tool  
Manufactured under U. S. Pat. 2,411,426

Waldes Kohinoor, Inc., 47-16 Austel Place  
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Please send me your descriptive brochure on  
Waldes Truarc Internal Grooving Tool.

Name \_\_\_\_\_

Title \_\_\_\_\_

Company \_\_\_\_\_

Business Address \_\_\_\_\_

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# bryant

## internal grinding



**no. 1309-W**

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3 1/2".



**no. 1109**

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3 1/2".



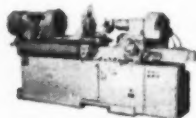
**no. 2209**

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, 3/4".



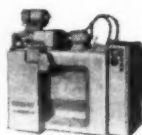
**no. 1116**

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



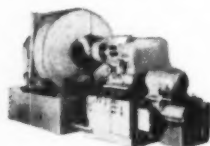
**no. 1416**

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



**no. 1209**

A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".

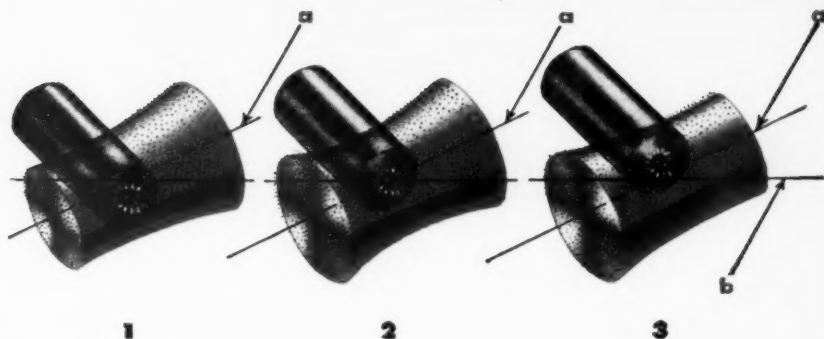


**no. 1460**

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".



"Alignment for Better Internal Grinding", a new, sound color moving picture is available for free showing to engineering groups. Write for descriptive booking form.



**U**SERS of internal grinders generally believe that once the grinding wheel passes the diamond, the form of the wheel will be a perfect cylinder. If the wheelhead is tipped so that its center line is not parallel with the motion of the longitudinal ways, the wheel cannot be trued to a perfect cylinder. In our illustration each wheel is tipped as it passes the diamond. Even though the diamond describes a straight line across the surface of the tipped wheel, the wheel will not be trued to a perfect cylinder. This is because the wheel is not being moved on a path along its own center line. When the wheel is tipped so that its center line "a" does not coincide with its direction of travel "b" as the wheel passes the diamond, an apparent taper "1" or "3", or an hour-glass "2" will be generated on the wheel. The vertical position of the diamond determines which one of these three forms will be produced on a tipped wheel. In this case we have two variables; that is, the wheel axis "a" may not coincide with its direction of travel "b", and the diamond may be above or below center.

Taper due to tipping of the wheel can be identified by raising or lowering the diamond. If the wheel is tapered as in "1" and after raising the diamond the form changes to "2" and again, after raising the diamond, the taper changes to "3", the front of the wheel (left end in illustration) is low and the wheel is tipped down. On the other hand, if the small diameter of the taper moves from right to left on the wheel as the diamond is progressively raised, the front of the wheel is tipped up.

An error in wheel form similar to those illustrated cannot produce a good hole either for size or shape, since there can be no straight line of contact for the full length of the wheel and the full length of the work as the wheel traverses. Furthermore, this distortion in the form of the wheel cannot be eliminated by simply turning the workhead. The remedy is to correct the alignment by bringing the wheel center line parallel with the wheel path (direction of wheel travel) and to the same height as the workhead center line, and setting the diamond in the plane established by the wheelhead and workhead center lines.

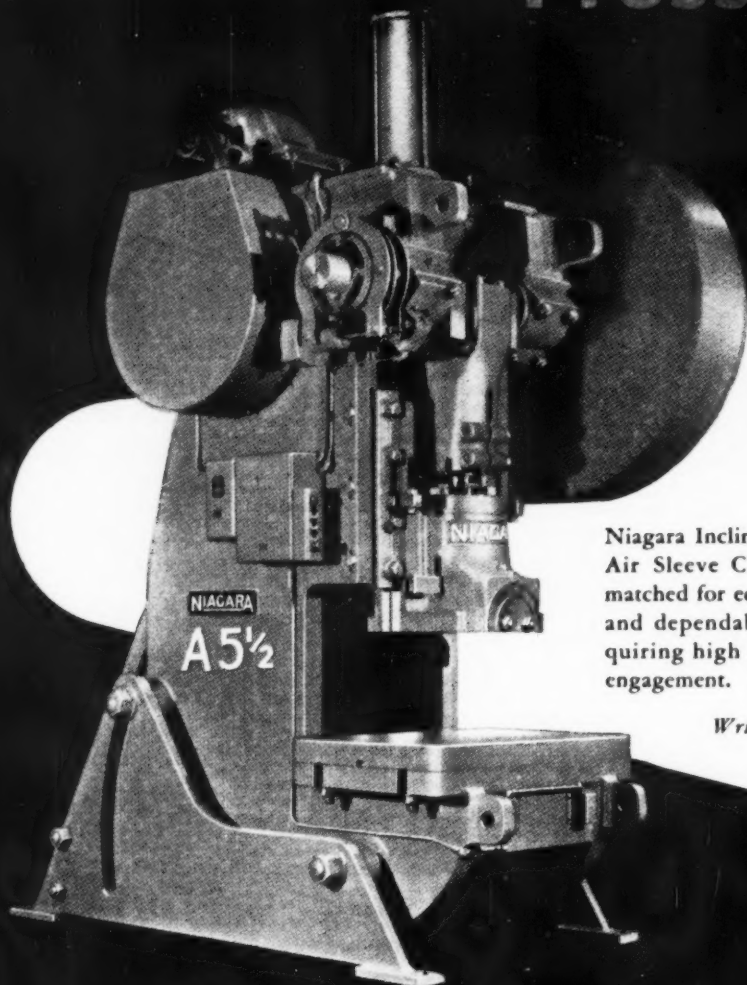
## Bryant Chucking Grinder Company

Springfield, Vermont, U. S. A.

*Internal grinders • Internal & External thread gages*

# NIAGARA

## Inclinable Presses



Niagara Inclinable Presses with Air Sleeve Clutch cannot be matched for economy, efficiency and dependability on jobs requiring high frequency clutch engagement.

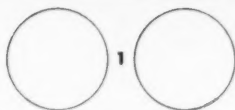
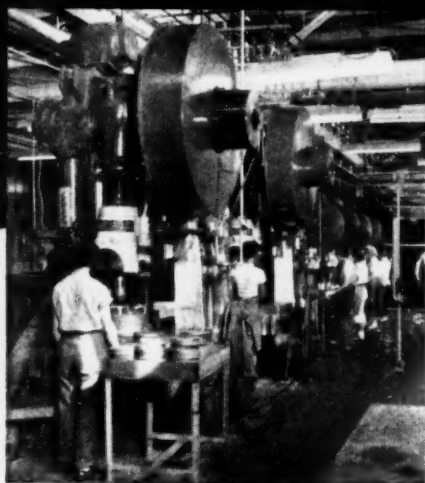
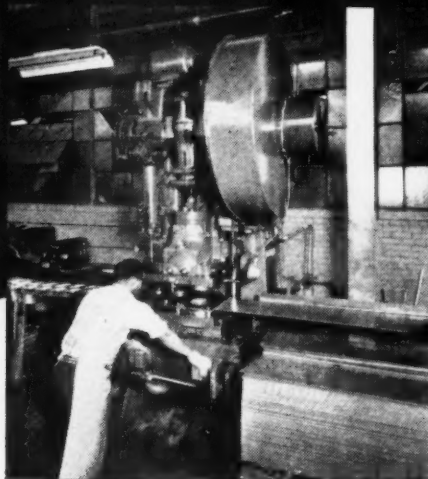
*Write for information.*

NIAGARA MACHINE & TOOL WORKS • BUFFALO 11, N. Y.



# On the Production Line

AT SHWAYDER BROTHERS, INC., DETROIT



1. Punching two round blanks per stroke on Niagara A-5½ Press with Air Sleeve Clutch.



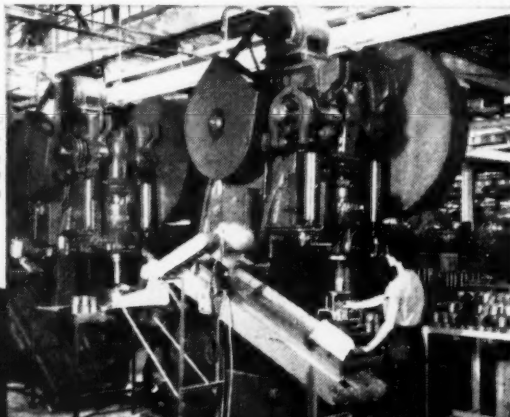
2, 3. Cupping and Re-drawing on A-5½ Presses with Air Sleeve Clutches.



4, 5, 6, 7. Indenting end on A-3½ Presses.



8, 9. Forming hexagonal shape and Ironing side wall on A-5½ Presses with Air Sleeve Clutches and with Niagara Cushions.



The final piercing and tapering operations are done on A-3½ Presses (not shown.)

## NIAGARA

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**DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA**

*Dealers in principal U. S. cities and major foreign countries*

"doing a job" at **TOOL STEEL** \*



**"Doing a job"  
is right!**

30% decreased grinding time, grinding costs way down, less operator fatigue, greater wheel life, increased production.

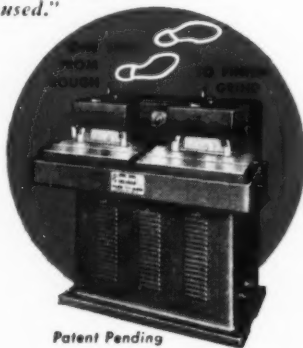
\* Here's what the Tool Room Superintendent at the Tool Steel Gear and Pinion Co., Cincinnati, Ohio says:

*"Since installation this Standard Tool Grinder has had no downtime . . . required no maintenance other than routine. We use the machine daily, sometimes continuously on production wet-grinding of carbide tipped hub-turning, offset turning, boring and other high-speed steel tools. It's by far the best precision grinder we've used."*

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MACHINE and TOOL BLUE BOOK

# OSBORN



**BEFORE:** Closeup of helical gear before deburring.

## Gone . . . costly thorns in their side

*Burr removal* by muscle methods is aggravating because it is costly, inefficient and non-uniform in quality. Here's how a truck manufacturer has banished these "thorns in the side" with push-button brushing.

The operation: to deburr, break and blend the flank edges of gear teeth prior to shaving and heat treating. Formerly done with a hand tool, in several operations, the work was tedious and required close inspection and reworking to meet rigid specifications.

Now, an Osborn Brushing Machine in one speedy operation smooths the entire tooth edge . . . produces *uniform blending* of surface junctures of *every tooth*. Result: lower costs and greater precision for *better performance* of the product in service.

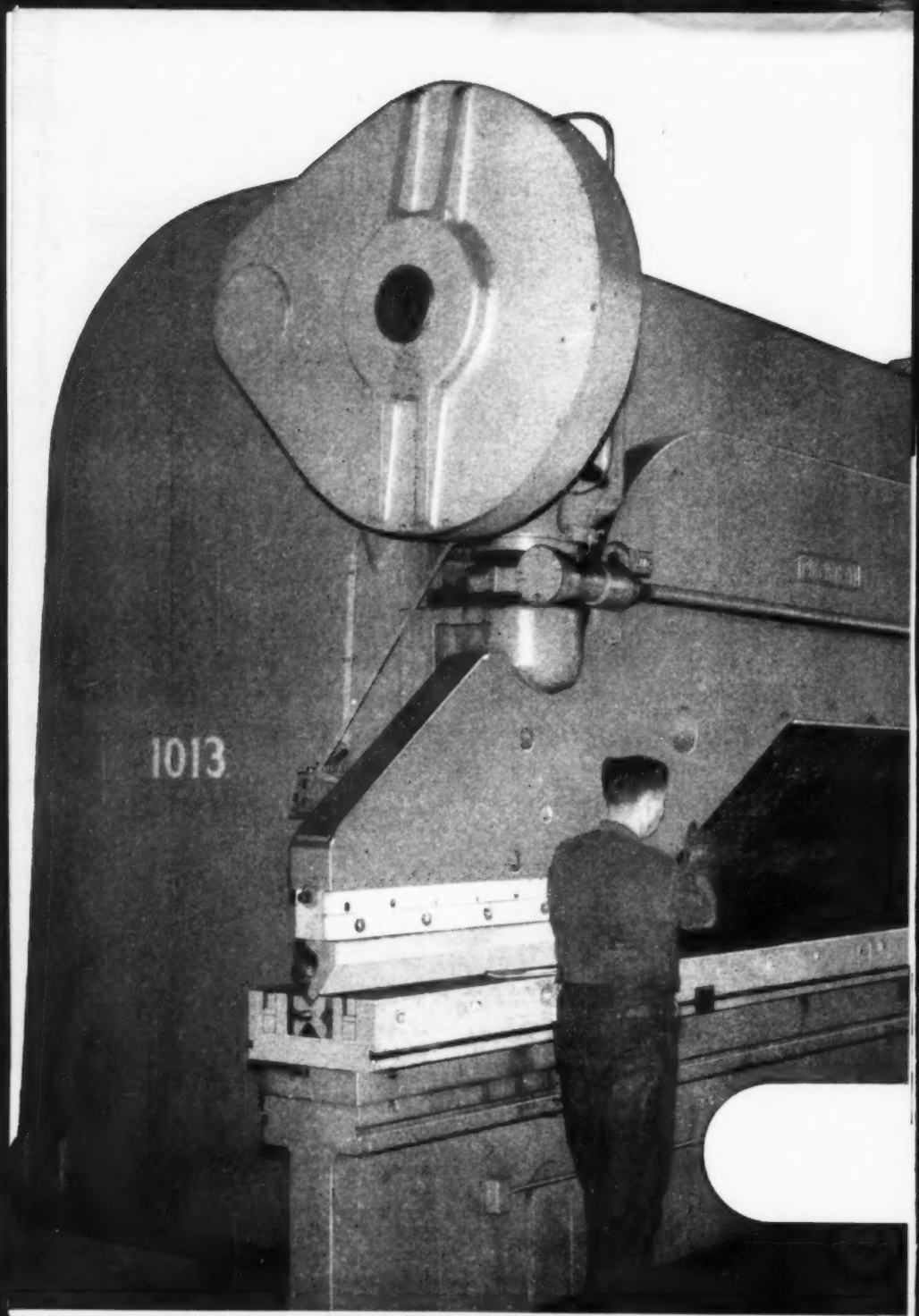
Find out how *you* can cut your costs and improve *your* products with power brushing. Call the nearby **Osborn Brushing Analyst** or write *The Osborn Manufacturing Company, Dept. L-3 5401 Hamilton Avenue, Cleveland 14, Ohio.*



**AFTER** deburring with Osborn Brushing Machine.

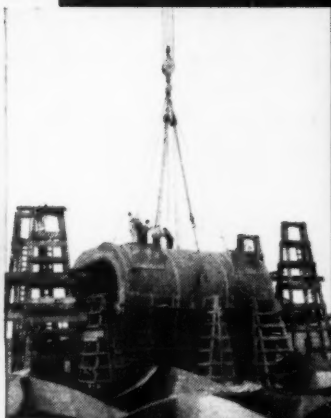
## Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



# *Here -* a Cincinnati Press Brake saves 3 ways...

1. TIME
2. NUMBER OF OPERATIONS
3. MATERIAL



Built at The Maryland Drydock Company, these giant condensers for the Westinghouse Electric Corporation are some of the largest ever constructed.

*Photographs courtesy of The Maryland Drydock Company, Baltimore, Maryland*

Crimping plate up to 3" thicknesses has cut roll-forming time in half at The Maryland Drydock Company.

The press brake crimps the ends of the plates with special dies, and has eliminated both the costly burning operation, and the loss of 15" to 18" of the ends of the plates.

Some of the large radius bends are done entirely on the Cincinnati Press Brake.

*Write for the NEW 72-page Press Brake Catalog B-4.*

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Long Life . . .

## OLIVER DIE MAKING MACHINES

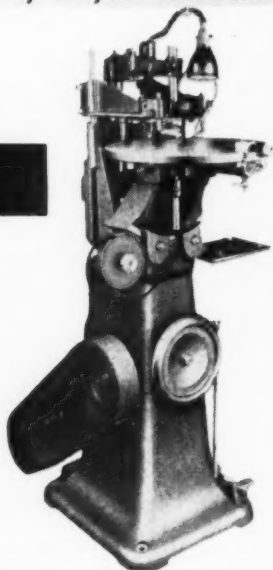


The Oliver Method of machine sawing, filing and lapping can save you time and headaches by increasing the efficiency of your toolroom.



best for making dies

Oliver Die Makers have been cutting costs for 40 years, saving toolrooms up to 60% and better in time and expense over hand methods of making dies. In thousands of plants throughout the world Oliver Die Makers are meeting production demands, giving long-lasting service (many Olivers have been in continuous use for more than 30 years), speedily, accurately, dependably. Skilled labor is not required on an Oliver due to the simplicity of operation. Modernize your die making methods the cost-cutting Oliver Way . . . Be Wise, OLIVERize.



### Oliver Die Makers available in 5 models —

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

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DIE MAKING MACHINES



for small holes in small parts

# MODEL A-33 **NATCO**

Small Adjustable Multi-Spindle Driller & Tapper

Typical parts tapped on  
NATCO A-33 Light Sensitive  
Machine illustrated.



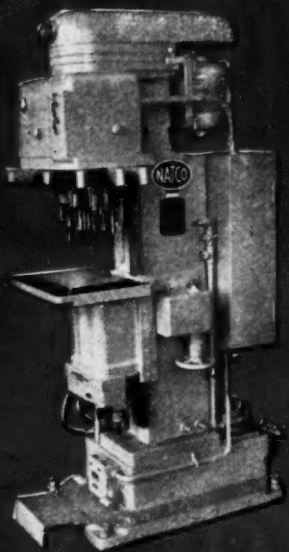
produces

**2,200**

parts per hour

**22,000**

10x32 tapped holes



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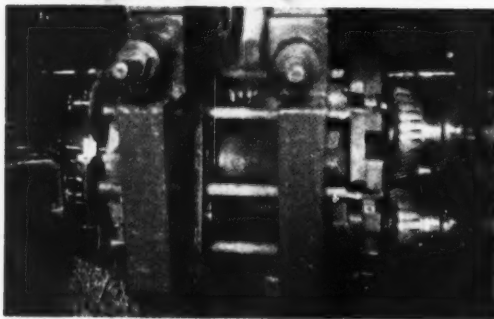


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Part..... Rear axle shaft  
Operation..... Rough and finish mill spline end  
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Cutters—fine pitch—inserted blade  
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Production..... 150 pcs. per hour  
1500-1700 pcs. per grind  
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**OLD METHOD**

Cost 1 set Inserted Blades..... \$48.00  
Pieces per Grind..... 275  
Grinding Hours per year..... 10,300  
5 Machines Running 3 Shifts  
Machine Repair per year..... \$25,000  
Tool Cost per Piece..... \$.00545\*

\*(Machine repair and grinding costs not included)

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METHOD**

Cost 1 set Inserted Blades..... \$54.60  
Pieces per Grind..... 1600  
Grinding Hours per year..... 2500  
3 Machines Running 2 Shifts  
Machine Repair per year..... \$1200  
Tool Cost per Piece..... \$.00213\*

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educational, full color,  
sound movie —  
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with the

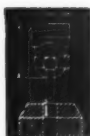
## TREE

### *Taper boring tool*

## OF TAPER HOLES

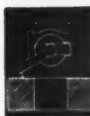
You can get your taper hole jobs done in a hurry and save set-up time, too . . . with the TREE TB-4. So versatile that it can taper bore up to 10" in diameter and can be used on your mill, jig borer or boring bar. . . . Precision ground for accuracy . . . Simple to use.

### 3 TREE EXTRAS



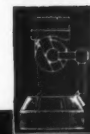
#### Straight Boring

The TB-4 can be used as an offset boring tool for jig and fixture boring.



#### Facing

Faces up to 10" in diameter; Graduated swivel base set at 90°.



#### Outside Turning

Straight or tapered outside turning with the extension bar.



For free literature or dealer information on the TREE TB-4 Taper Boring Tool, the 2UV Vertical Milling Machine or the MH-4 Milling Machine Attachment, write Dept. B.

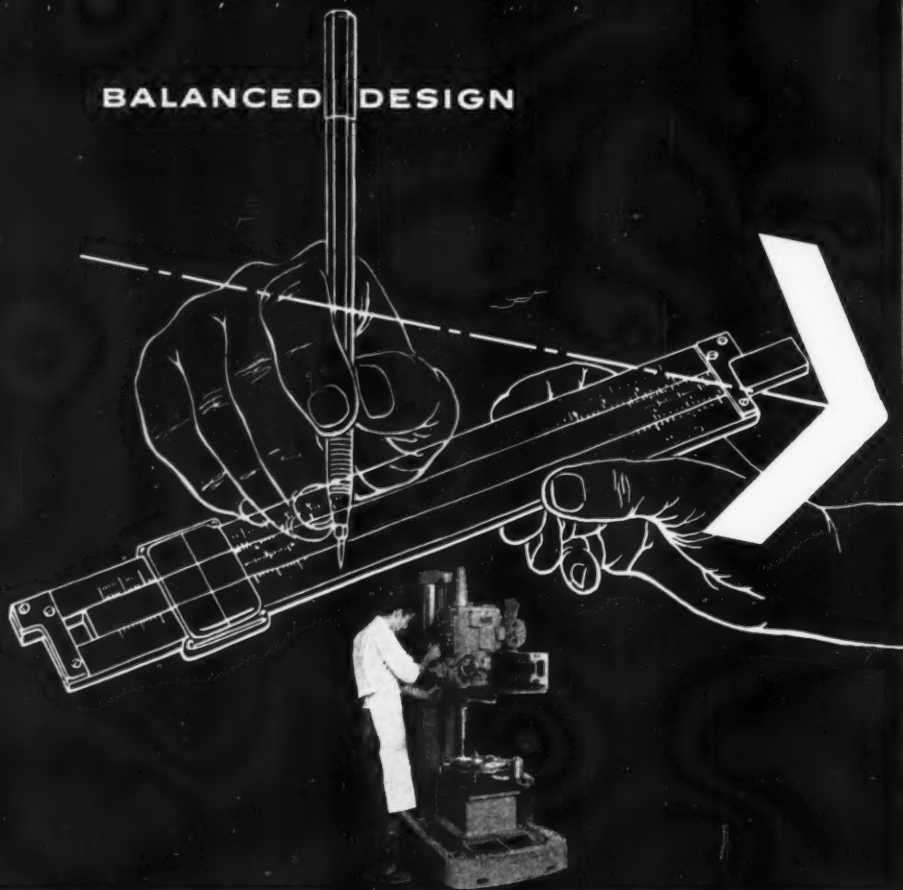
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## BALANCED DESIGN

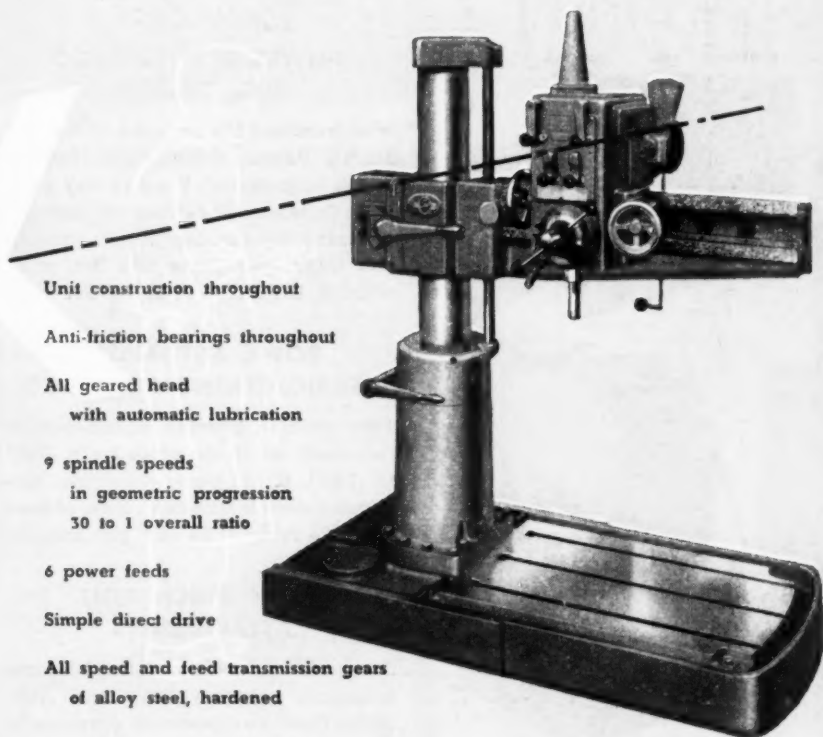


We're getting reports from all over the country on how operators really like the new 3' Arm 7" Column Radial Cintidrill. The smooth way it "handles" . . . the wide range of jobs within its 1-inch capacity . . . its round-the-clock reliability—can all be summed up as BALANCED DESIGN. It'll be worth a check right soon on how this new economy-priced radial can smooth out drilling schedules and save money for you.

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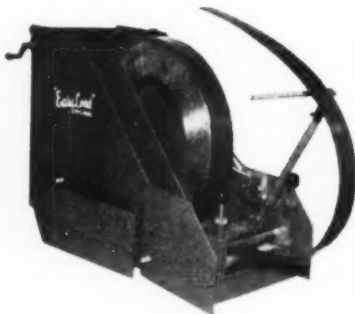
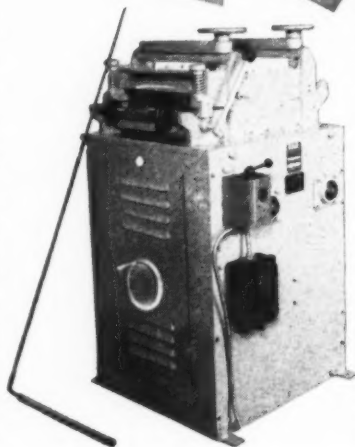
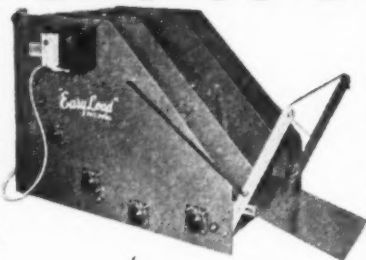
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# ROWE



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Will handle 90% or more of all coil stocks. Power driven rolls. Instant width adjustment. Feed in any position. Constant slack loop of material provided for feeding punch presses, etc. Capacities from 200 lbs. x 6" wide to 15,000 lbs. x 48" wide.

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SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
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5	30-32-36-48-80	7/16	12-16-18-22-24-27-28-30-32-36-40	1-13/16	8-10-12-14-16-18-20
6	36-40-48-56-80	1/2	12-14-16-18-22-24-26-27-28-30-32-40	1-7/8	8-10-12-14-16-18-20-24
7	32-40	9/16	16-20-24-27-28-30-32-40-48	1-15/16	8-10-12-14-16-18-20-24-28
8	24-30-36-38-40-44-48	5/8	12-14-16-20-24-27-28-32-36-40	2	4-1/2-8-10-12-16-18-20
9	24-28-32-40	1 1/16	11-16-18-20-24-27-28-30-32	2-1/16	12-14
10	28-30-36-40-48-64	3/4	9-11-12-14-16-20-24-26-27-28-32	2-1/8	12-16-20
12	20-28-32-38	13/16	10-14-16-20-32	2-3/16	12-16
14	20-24-28	7/8	10-12-16-18-20-24-27-28-32	2-1/4	4-1/2-8-12-14-16-18
1 1/8	60-64	15/16	8-9-10-12-14-16-18-20-24-32	2-5/16	12-18
5/64	72	1	10-12-16-18-20-24-27-32-40	2-3/8	12-16-18
3/32	48	1-1/16	12-14-16-18-20-24	2-1/2	8-10-12
7/64	48-56	1-1/8	8-10-14-16-18-20-24-32	2-9/16	18
1/8	32-40	1-3/16	8-10-12-14-16-18-20-24	2-5/8	12-16-20
5/32	32-36-40	1-1/4	8-10-14-16-18-20-24-32	2-3/4	16
9/64	36-40	1-5/16	12-14-16-18-20-24-32	2-7/8	8-12-16
11/64	36	1-3/8	8-10-14-16-18-20-24	3	8-16
3/16	20-24-32	1-7/16	8-10-12-16-18-20-24	3-1/4	8-12-16
13/64	32	1-1/2	8-10-14-16-18-20-24-28	3-1/2	8-12-16
7/32	24-28-32	1-9/16	18-20-24	3-7/8	6
1/4	18-24-28-27-30-32-36-40	1-5/8	5 1/2-8-10-12-13-16-18-20-24	4	8-12
5/16	16-20-22-27-28-32-40	1-11/16	10-12-14-16-18-20-24		



**HIGH SPEED LEFT HAND TAPS**

SIZE	THREAD	SIZE	THREAD	SIZE	THREAD
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1	56-64-72	7/16	14-20-28	1-7/16	8-10-12-14-16-18-20
2	56-64	1/2	12-13-20-28	1-1/2	8-8-10-12-16-18-20
3	56	9/16	12-18-20-24	1-9/16	8-10-12-16-18-20
4	32-36-40-48	5/8	11-12-18-20-24	1-5/8	8-10-12-14-16-18-20
5	40-44	1 1/16	11-16-24	1-11/16	8-10-12-14-16-18-20
6	32-36-40	3/4	10-16-18-20	1-3/4	8-10-12-14-16-18-20
8	32-36-40	13/16	16	1-13/16	8-10-12-14-16-18-20
10	24-30-32-40	7/8	9-12-14-18-20	1-7/8	8-10-12-14-16-18-20
12	24-28-32	1	8-12-14-16-18-20	1-15/16	8-10-12-14-16-18-20
1/4	20-28-32	1-1/8	7-12		
5/16	18-20-24-28-32	1-1/4	7-12-16-18	2	4 1/2-10-12

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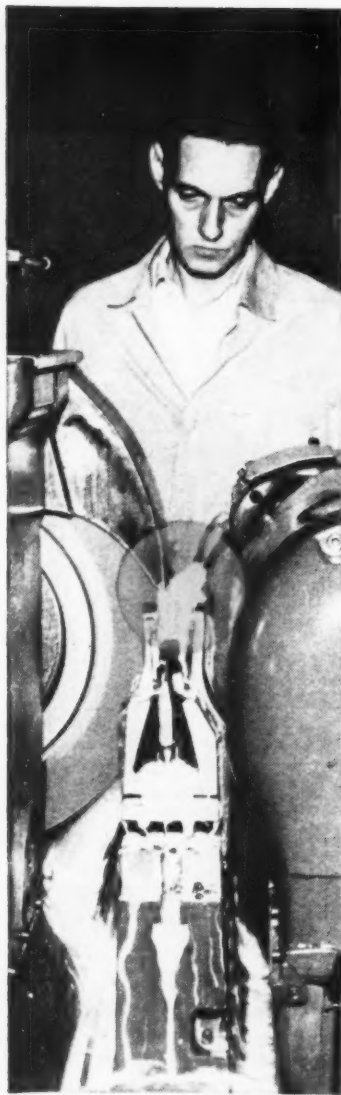
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**SOMETHING NEW IN HIS EXPERIENCE.** It takes a lot of proof to convince grinding machine operators that one vitrified bond can be so much more efficient than another. Yet the new Norton G Bond has already made plenty of friends in plants throughout the country. How about getting your own shopmen's reactions to the "Touch of Gold"?

## Add the **"TOUCH OF GOLD"** to your grinding with the NEW Norton **G BOND**

Here, ready to bring you immediate benefits, is the most radically improved vitrified bond ever produced — the new Norton G Bond!

Norton ALUNDUM\* wheels made with the new G Bond cut freer, cooler and faster, hold corners better, are better for form grinding and produce a smoother finish. They do more work per wheel because they dress easier and produce more pieces per dressing.

Every one of these advantages means time and money saved — the real "Touch of Gold" that adds more value to your products and increases your profits by reducing your grinding costs.

**YOUR NORTON DISTRIBUTOR** can supply you promptly with ALUNDUM wheels in the new G Bond. Ask him about arranging a try-out in your plant. Or write to **NORTON COMPANY**, Worcester 6, Mass. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

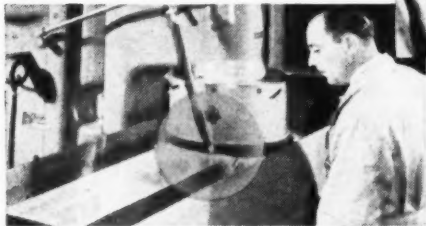
### How the new G bond assures more efficient cutting action

ALUNDUM abrasive grains are held by the G Bond until they've done the most effective cutting job, then released to make way for new grains with fresh, sharp cutting edges. It's this unique ability of the new bond to hold the grains *just long enough* that keeps the wheel's grinding surface at constant peak efficiency.

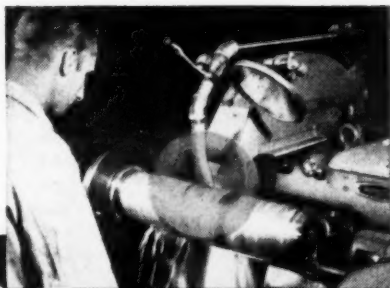


## Make these 3 easy tests...

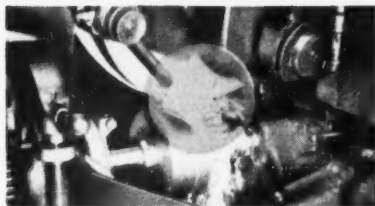
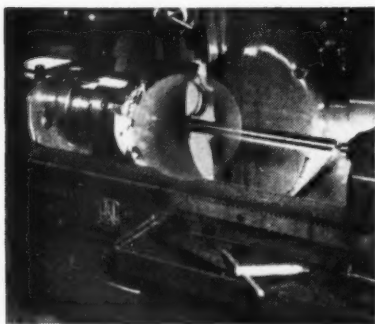
**LOOK!** You can see the difference in the spark stream of a Norton G Bond ALUNDUM wheel. No intermittent sparking, but a continuous, even stream that means uniform cutting action.



**LISTEN!** Norton G Bond wheels grind with the pleasant, steady swish-h-h of free, easy cutting. You hear no harsh grinding noise.



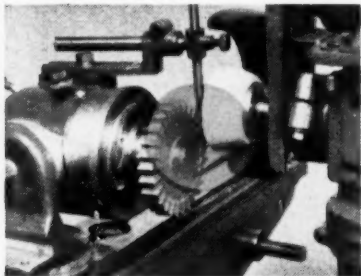
**EXAMINE!** On precision jobs, especially, you'll get the results you want faster. And every job you do with G Bond wheels will benefit by their new, unique cutting action.



**NORTON**  
ABRASIVES

*Making better products  
to make other products better*

\*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries



**G BOND WHEELS HANDLE MANY JOBS**, big and little, easy or difficult. You'll find them particularly valuable for such types of grinding as cylindrical, centerless, surface, internal, gear, tool and cutter, form and thread grinding and saw gumming.



HIGH PRESSURE

## HYDRAULIC CYLINDERS

**HARD  
CHROME PLATED  
PISTON RODS**

Prevent Scratch-Damage,  
Nicks and Rust

**SOLID STEEL HEADS,  
CAPS and MOUNTINGS**

Eliminate Breakage

## DELIVERY

Our normal delivery is now 8 to 10 weeks or longer whenever possible. However, we can make occasional deliveries to meet your **RUSH** cylinder requirements as follows:

Standard Models except  
as noted below..... 4 - 5 weeks  
Models 81 and 82..... 6 - 7 weeks  
Water-Fitted Models..... 7 - 8 weeks  
Precision Seal and  
other "Specials"..... 8 - 9 weeks  
or longer

*All Delivery Promises Are  
Dated from Our Receipt  
of Complete Information  
At Our Plant*

## DIRT WIPER SEALS

Protect Rods, Seals, Bushings

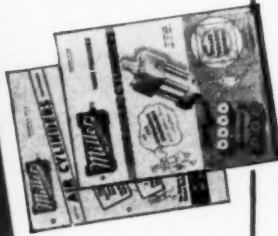
Standard Leather Cup Seal Assembly Shown Is Interchangeable With Miller Standard Piston Ring Piston Assembly

**MET J. I. C. HYDRAULIC STANDARDS** years before their adoption in 1949.

**SPACE-SAVING SQUARE DESIGN** originated by Miller in 1945.

WRITE FOR CYLINDER BULLETINS H-104 and A-105

Complete Miller cylinder line includes: air cylinders, 1½" to 20" bores, 200 PSI operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 PSI operation, 8" to 14" bores for 250 PSI; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 PSI operation. All mounting styles available.



### SALES AND SERVICE FROM COAST TO COAST

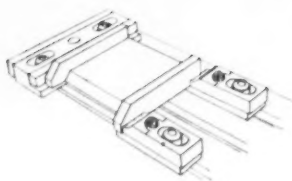
CLEVELAND • YOUNGSTOWN • DAYTON • PITTSBURGH • PHILADELPHIA  
BOSTON • HARTFORD • NEW YORK CITY • BUFFALO • ST. PAUL • GRAND  
RAPIDS • DETROIT • FLINT • FORT WAYNE • SOUTH BEND • INDIANAPOLIS  
• MILWAUKEE • LOUISVILLE • KANSAS CITY • SEATTLE • LOS ANGELES  
SAN FRANCISCO • BALTIMORE • DENVER • ST. LOUIS • MOBILE • CHICAGO  
• HOUSTON • TORONTO, CANADA and OTHER AREAS



**MILLER MOTOR COMPANY**

2026 N. HAWTHORNE AVE., MELROSE PARK, ILL.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS  
COUNTERBALANCE CYLINDERS

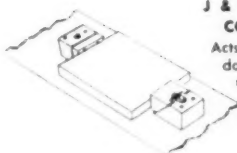


### J & S DOUBLE 1/2 VISE WITH MATCHING PARALLELS

- for unquestionable repeated accuracy
- for quicker set-ups
- for stronger grip
- for less obstruction

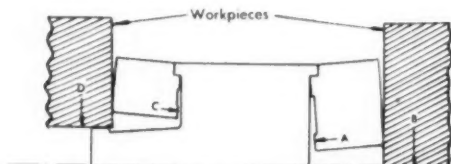
### DOUBLE 1/2 VISE IN USE WITH ALL-PURPOSE JAW CLAMPS

for use on jig borers, millers, planers  
and shapers.



### J & S DOWN-HOLDING COUNTER CLAMPS

Acts on same principle as  
double 1/2 vise (left). Fix-  
ture clamps operate on  
the same principle as  
the all purpose jaw  
clamps.



Approximately 3 tons pressure closes Gap A, and approx-  
imately 1 1/2 tons closes Gap C—producing a down-holding  
action on each respective piece of approximately the  
same force.

### Hinged, Spring-Loaded Jaw Gives Positive Down-Holding Action

Hinged lip in-and-down action combined with in-and-  
down action of clamp holds workpiece against table and  
absolutely parallel. **Construction is of oil-hardened  
tool steel, ground and blackened.**

**Jig Borers**—quickly set up for jig boring accuracy.

**Millers**—eliminates heavy miller vise and allows milling  
of more pieces.

**Planers**—eliminates strap and finger setups.

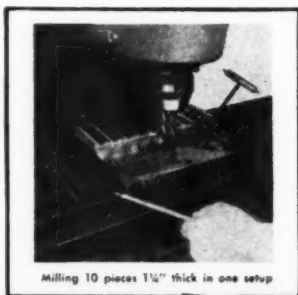
**Shapers**—eliminates vises.

**J & S TOOL CO., INC.**

647 W. Mt. Pleasant Ave.

Livingston, N. J.

(N. J. Highway Route No. 10)



Milling 10 pieces 1 1/4" thick in one setup

**J & S  
TOOL CO. INC.**

DELIVERY FROM STOCK

WRITE FOR NEW FOLDER

contains complete details on advantages,  
applications, types and sizes available.  
Booklet describing J & S "Fluidation"  
Wheel Dressers, etc. also sent on request.



**2 STANDOUT  
VALUES!**



**NATIONALLY  
KNOWN  
SNAP  
GAUGES**

PRECISION-MADE instruments at new low prices. Ash offers 31 sizes, adjustable within ranges shown below. All are lap finish, for longer life. Complete stock of other styles in Snap Gauges.

**SAVE  
75%**

on high grade  
precision-ground

**PARALLELS**

3x2x14"

**\$5<sup>00</sup>**  
3x3x14":  
**\$6<sup>00</sup>**

Made from high grade, special analysis semi-steel castings. Two sides are heat treated, precision ground and machined. All sides are parallel to within .00025 inch in 6 inches; and square to within .0005 inches in 6 inches.

**ASH & CO.**

5100 GRAND RIVER DETROIT 8, MICH.

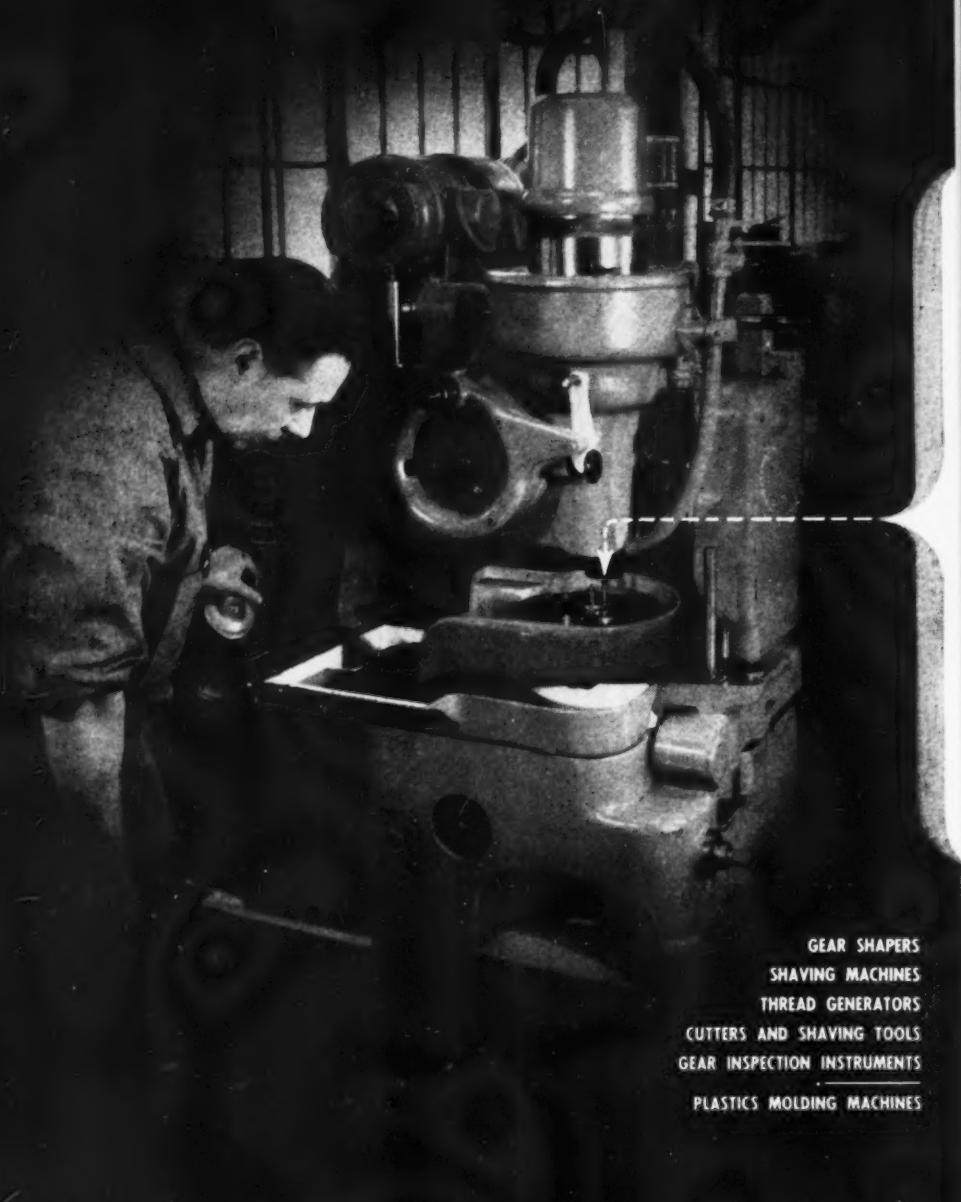
TYler 4-2258

**INSTRUMENTS OF QUALITY**

**IMMEDIATE DELIVERY**

FRAME NO.	SIZE RANGE: INCHES	EACH
1	0 - $\frac{1}{4}$	\$5.40
2	$\frac{1}{4}$ - $\frac{1}{2}$	5.75
2x	$\frac{1}{2}$ - $\frac{3}{4}$	5.75
3	$\frac{3}{4}$ - 1	6.00
3x	1 - $1\frac{1}{4}$	6.00
4	$1\frac{1}{4}$ - $1\frac{1}{2}$	6.25
4x	$1\frac{1}{2}$ - $1\frac{3}{4}$	6.25
5	$1\frac{3}{4}$ - 2	6.75
5x	2 - $2\frac{1}{4}$	6.75
6	$2\frac{1}{4}$ - $2\frac{1}{2}$	7.00
6x	$2\frac{1}{2}$ - $2\frac{3}{4}$	7.00
7	$2\frac{3}{4}$ - $3\frac{1}{16}$	7.50
7x	$3\frac{1}{16}$ - $3\frac{1}{8}$	7.50
8	$3\frac{1}{8}$ - $3\frac{1}{4}$	8.00
8x	$3\frac{1}{4}$ - $4\frac{1}{16}$	8.00
9	$4\frac{1}{16}$ - $4\frac{9}{16}$	8.50
9x	$4\frac{9}{16}$ - $4\frac{11}{16}$	8.50
10	$4\frac{11}{16}$ - $5\frac{1}{16}$	9.50
10x	$5\frac{1}{16}$ - $5\frac{1}{8}$	9.50
11	$5\frac{1}{8}$ - $6\frac{1}{16}$	10.50
11x	$6\frac{1}{16}$ - $6\frac{5}{8}$	10.50
12	$6\frac{5}{8}$ - $7\frac{1}{8}$	11.75
12x	$7\frac{1}{8}$ - $7\frac{3}{4}$	11.75
13	$7\frac{3}{4}$ - $8\frac{1}{8}$	12.00
13x	$8\frac{1}{8}$ - $8\frac{3}{4}$	12.00
14	$8\frac{3}{4}$ - $9\frac{1}{8}$	12.50
14x	$9\frac{1}{8}$ - $9\frac{5}{8}$	12.50
15	$9\frac{5}{8}$ - $10\frac{1}{8}$	13.00
15x	$10\frac{1}{8}$ - $10\frac{3}{4}$	13.00
16	$10\frac{3}{4}$ - $11\frac{1}{8}$	13.50
16x	$11\frac{1}{8}$ - $11\frac{3}{4}$	13.50

# USING Fellows Original C



GEAR SHAPERS  
SHAVING MACHINES  
THREAD GENERATORS  
CUTTERS AND SHAVING TOOLS  
GEAR INSPECTION INSTRUMENTS  
PLASTICS MOLDING MACHINES

PR

# Cutters ...

**CONTROL INSTRUMENT COMPANY  
KEEPS REJECTS "well under 1%"**



## PRODUCTION DATA

Number of Teeth (Cutter)	18
(Limited by projecting hub)	
Number of Teeth (Gear)	96
Pitch	48
Pressure Angle	20°
Pitch Diameter	2.000 (+.002; -.000)
Run Out (Total Indicator Reading)	.001
Number of Cuts	2
Production Time (2 Cuts)	90 minutes
Blank Material	4140 Chrome Moly Steel

Control Instrument Company of Brooklyn, New York, uses a Fellows 7-Type Gear Shaper to cut this 2.000" pitch diameter internal gear for a military fire-control device.

Using original Fellows cutters for both rough and finish cuts of this 4140 Chrome Moly steel, the number of rejects is exceedingly small. Control Instrument Company says, "...using Fellows cutters, our rejects are well under 1%."

The versatile Fellows 7-Type is the most widely used size in Fellows' complete line of Gear Shapers which generate gears from 1/16" to 120" diameter. It offers precision and high production on external gears up to 7" diameter, 1 1/2" face and on internal gears up to 5 1/2" diameter, 1" face. Set-up is simple, and changeover on production runs is quick.

For helpful information on cutting coarse or fine pitch gears, cams, ratchet teeth, interrupted profiles, segment gears, face gears, racks, and other unusual, high quality gears—just write, wire or 'phone the Fellows office nearest you.

# *Fellows*

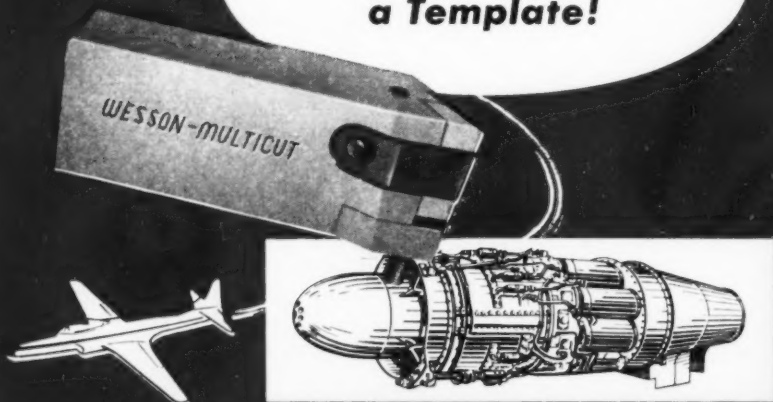
THE FELLOWS GEAR SHAPER COMPANY • Head Office and Export Department • 78 River Street, Springfield, Vermont  
Branch Offices: 323 Fisher Bldg., Detroit 2 • 5835 West North Avenue, Chicago 39 • 2206 Empire State Bldg., New York 1



Developed for Jet Engine Production on  
**"FOLLOWER" LATHES**

## WESSON MULTICUT style 10

**The Tool Holder  
that takes orders from  
a Template!**



**...and Makes Jet Engine Production Jump!**

Jet engine shrouds and discs are being machined 4 to 6 times faster—an follower or tracer equipped lathes. With Wesson's #10 Multicut tool holder and a Wesson-metal 55° solid carbide insert, a maximum cutting edge clearance of 35° on both sides

is possible for straight shoulder turning. The two cutting edges will permit a cut from right to left or left to right. Insert provides a total of four cutting edges when turned and for end. Write today for details.

**WESSON COMPANY** *Affiliated with*  
**WESSON METAL CORPORATION**

1220 Woodward Heights Blvd., Ferndale (Detroit 20), Mich.

PIONEERS  
IN THE ART OF  
DESIGNING  
AND  
PRODUCING  
CARBIDE TOOLS

# Norgren

## Cuts Compressed Air Costs...

**saves  
maintenance  
dollars!**



... simply by using Norgren Pressure Regulators to reduce air line pressures to the working pressures specified by air equipment manufacturers.

### HERE'S HOW...

a  $\frac{1}{4}$ " air screwdriver, for example, with a recommended working pressure of 80 psi. is operated at main line pressure of 110 psi.

### This means:

30 psi. excessive and wasted pressure, causing increased wear on parts and increasing maintenance costs.

### COMPRESSED AIR WASTE:

at 110 psi. a  $\frac{1}{4}$ " screwdriver uses 18.5 cfm.  
at 80 psi. a  $\frac{1}{4}$ " screwdriver uses 13.5 cfm.

Air waste per minute 5.0 cubic feet

If the tool is used 50% of the time each 8-hour day you are wasting 316,800 cu. ft. of air a year.

If your cost of compressed air, using reciprocating compressors, is approximately 18c per thousand cu. ft. your loss would amount to \$57.02 per year per tool.

Using ten air screwdrivers under these conditions means you are losing \$570.20 per year in addition to paying higher equipment maintenance costs and getting shorter equipment life.

**For Only \$920 YOU CAN STOP THESE LOSSES WITH A NORGREN REGULATOR**

**write, now, for catalog sheet on  
NORGREN REGULATORS**

- Lubricators • Hose Assemblies
- Valves • Filters • Regulators

**PIONEER AND LEADER IN OIL FOG  
LUBRICATION FOR 25 YEARS**



**Norgren<sup>®</sup>**  
C. A. CO.

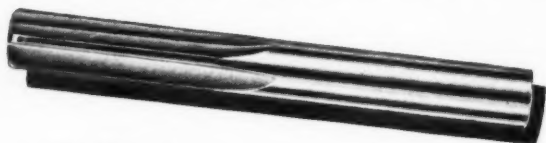
3438 SO. ELATI ST., ENGLEWOOD  
IN COLORFUL COLORADO

A  
T  
R  
A  
X

is for **ATRAX** . . . the finest of cutting tools.



is for **TOUGH** . . . they're solid tungsten carbide.



is for **RIGHT** . . . they're precision ground-from-the-solid.



is for **ACTION** . . . when Atrax tools solve difficulties in your production line.



is for **X-TRAS** . . . Atrax tools give with longer service, less trouble, better profits.

Representatives and Distributors in principal cities in United States and Canada. Write for name of representative in your area.

THE  
**ATRAX** COMPANY

Send for  
complete  
catalog  
NOW!



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CONNECTICUT

## Endurance Insurance for your tools

Your tools need  
insurance, tool . . . the  
kind that Adamas  
Carbide gives:

**Premium performance**  
... work-proved  
Adamas Carbide grades,  
job-engineered to fit  
both YOUR special and  
standard applications.

**Coverage** against  
costly down-time . . .  
there's no faster  
delivery in the industry  
than Adamas'.

It costs you no more to  
get this **protection**  
... maximum tool-life,  
minimum production costs.

Write, wire or phone for  
your ADAMAS CARBIDE  
catalog today . . . and  
get the "best tips"  
in the industry.

# ADAMAS

TUNGSTEN CARBIDE

1953 ADAMAS CARBIDE CORP. HARRISON, NEW JERSEY

**WHY  
YOU  
GET**

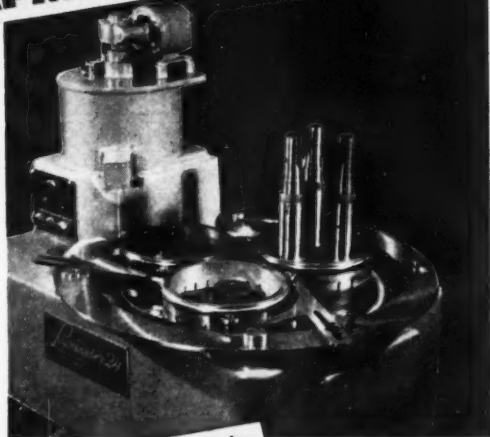
*Precision Flatness,  
Finish and Parallelity  
in Production Quantities...*

## **WITH A LAPMASTER**

Here is the machine to do the job if you want precision flatness in production quantities at an economical rate. Lapmaster machines readily lap to the extreme close tolerance of one light band (0000116") or less. In addition, they produce an extremely fine finish to as low as 1 RMS.

Check these features and investigate the possibilities for the Lapmaster in your plant

1. Operator requires no previous lapping experience
2. Automatic timer provides controlled lapping cycle for production efficiency and allows time for pre-loading work-holders.
3. Simplicity of design allows ease of loading and unloading.
4. Loose abrasive distributed evenly over lapping area insures uniform results.
5. Serrated lap plate collects and disposes of spent compound and removed stock.
6. Precision laps identical parts or parts of various shapes, heights and materials in one cycle.
7. Self-conditioning lap plate eliminates down time for truing or replacement.




### **How the Lapmaster Works**


The work being lapped causes wear on heavy cast iron lap plate.



As the work is wearing the lap, the conditioning rings are continually conditioning the lapping plate surface.



Since the wear action of the conditioning rings is greater than the wear caused by the work being lapped, the flatness of the lap plate is automatically maintained.



**FREE  
DATA**



Learn more about the possibilities of production lapping and the interesting subject of measuring flatness. The illustrated fact-filled booklet are yours for the asking. Write today.

**JOHN CRANE**

Crane Packing Company, Dept. 885, 1812 Cuyler Avenue, Chicago 14, Illinois

**CRANE PACKING COMPANY**

H

anson Whitney

announces

the most advanced work  
famous Hanson Process

## Hydraulic Thread Milling Machine

## new features

Hydraulic-driven cutter and work spindles insure balanced cutter speed and work feed — provide rapid traverse carriage. Variable cutter speeds up to 3,000 R. P. M. make possible instant adjustments during operating cycle. High speed permits efficient use of carbide cutters where applicable. The famous Hanson features of interchangeable lead cams, cross-feed cams, and completely semi-automatic operating cycles are retained in these machines.

Extensive field tests prove increased production, accuracy, and improved finishes. Production costs cut in half . . . cutter life three times greater.

Manufactured in the following capacities: 4" x 9", 10" x 24", 15" x 30", and 20" x 48". Longer beds to suit customers' requirements.

Engineered, Produced and Sold by the  
HANSON-WHITNEY DIVISION of the WHITNEY CHAIN CO.  
169 Bartholomew Avenue, Hartford, Connecticut, U. S. A.

The Most Revolutionary Improvement in Thread Milling Since the invention of the Thread Milling Machine in 1901 by the Late B. M. W. Hanson, Founder of the Company.

## the HANSON

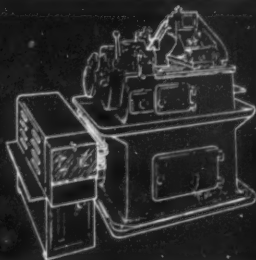
Threading Practices  
Offer Complete  
Coordinating  
Responsibility

for  
The Machine Tools  
The Cutting Tools  
The Measuring Gages

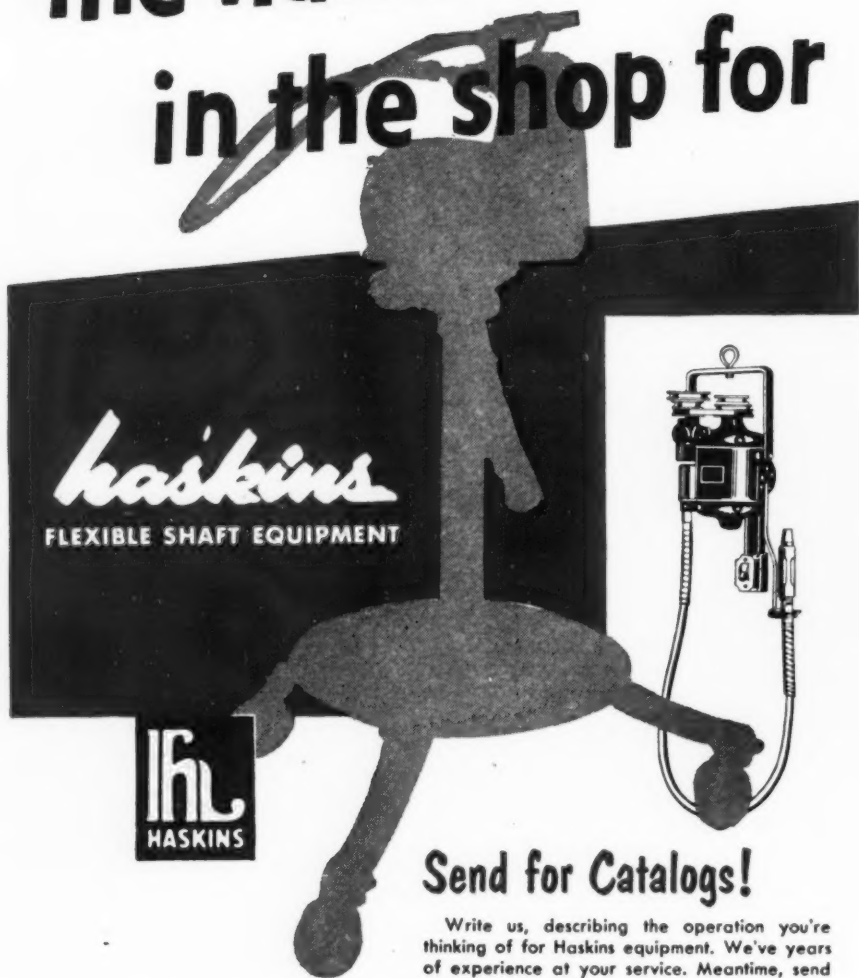
HW53B

May, 1953

If you have a threading problem,  
the "Hanson Process" will offer you the most  
economical solution. Inquire today.



# the handiest tool in the shop for



*Haskins*  
FLEXIBLE SHAFT EQUIPMENT



## Send for Catalogs!

Write us, describing the operation you're thinking of for Haskins equipment. We've years of experience at your service. Meantime, send for complete Catalog.



wire brushing

deburring

polishing

sanding

filing

grinding

buffing

weld-blending

die-finishing

**is**

**Haskins**

After all, when you have to depend on hand work it's hard to resort to the equipment that will do the job most satisfactorily—and at lowest labor cost.

That's why Haskins flexible shaft equipment has for so long been standard equipment in so many of the finest and largest metal working plants—from the tool room to the production line.

It does equipment makes the operator's hands more efficient in all the operations listed above—and more. And it affords long life in heavy duty service for real economy.

**R. G. HASKINS COMPANY**

2647 West Harrison St., Chicago, Ill.

Send Catalog of Haskins equipment for working on (state type of work):

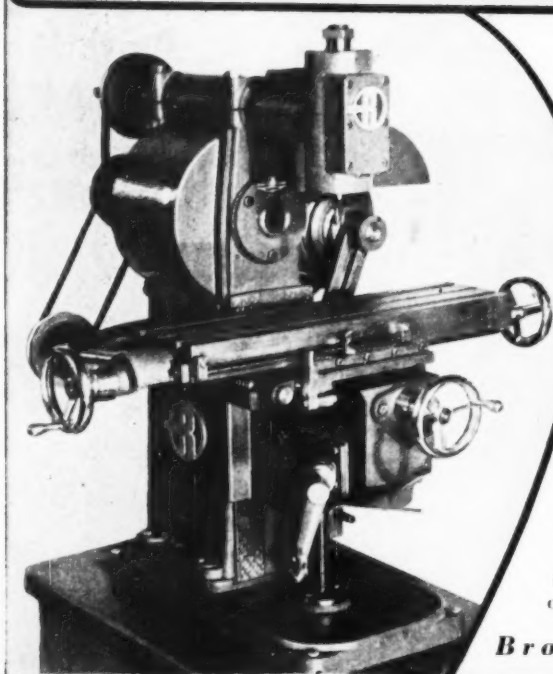
Name \_\_\_\_\_

Firm Name \_\_\_\_\_

Street Address \_\_\_\_\_ City \_\_\_\_\_

State \_\_\_\_\_

# 540 CU. IN. METAL CAN BE WORKED ON ROTEX BENCH MILL'S 100 SQ. IN. TABLE



New Rotex Bench Mill provides 12" long, 9" vertical and 5" traverse on its 5" x 20" table surface . . . a remarkably high degree of table surface utilization!

Heavy work ordinarily requiring larger, expensive mills is readily accomplished on this extremely rigid, low cost bench mill. The large diameter spindle supplied with a No. 10 B&S or No. 4 Morse taper and operating at 15 separate spindle speeds is equipped with large Timken bearings. Dovetail type ways are hand scraped. Milling of T slots from solid insures inflexible anchoring of work. Power feed is .003, .006 or .012 per spindle revolution. Available with or without motor or accessories.

*Brochures Available*

## ROTEX PUNCH CO., INC.

2350 Alvarado St. • San Leandro, Calif.

### SEE ROTEX MILL AT FOLLOWING DISTRIBUTORS

NUTLEY, N. J., DoAll New Jersey Co., Inc.:  
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Co.: INDIANAPOLIS, IND., E. L. Humston &  
Co.: LOS ANGELES, CALIF., Dayton & Bake-  
well, Montague-Harris & Co.: SAN FRANCISCO,  
CALIF., Monrague-Harris & Co., PORTLAND,

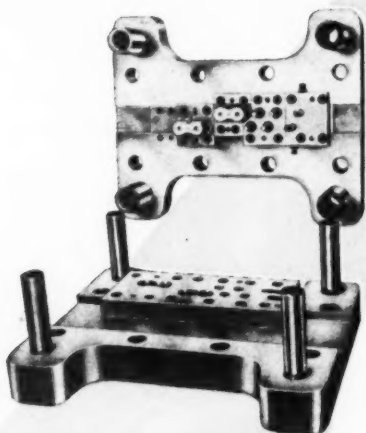
ORE., J. F. Muellenberg Machinery Co.: SEAT-  
TLE, WASH., Star Machinery Co.: DETROIT,  
MICH., DoAll Detroit Co.: OAKLAND, CALIF.,  
Delta Equipment Agency: SAN JOSE, CALIF.,  
San Jose Hardware Co.: BURBANK, CALIF.,  
Production Machinery Sales: TULSA, OKLA.,  
DoAll Tulsa Co.

WHITNEY CHAIN

links up with ...



## PRODUCTO DIE SETS



### MATERIAL

$\frac{1}{4}$ " SAE 3140 hot rolled steel in coiled stock.

### OPERATIONS

Station No. 1 — Whitney Chain markings clearly embossed on each link.

Station No. 2 — Four holes, two to a link, rough pierced.

Station No. 3 — Two chain links blanked out on each press stroke.

Tough,  $\frac{1}{4}$  inch-thick hot rolled steel chain links are not an easy stamping job . . . especially when heavy production must be matched with close tolerances and excellent finish.

### TOLERANCES

Hole diameter + .0005" — .0005"

Hole centers + .001" — .001"

Link Contour + .005" — .010"

Die Set face parallel to feed slot + .002" — .002"

Here are the figures as this job rolls along at Whitney Chain on Niagara presses equipped with PRODUCTO 4-pin progressive die sets. It's typical of the way Producto Service teams up to set production records.

### PRODUCTION RATE

153,000 links blanked per 40 hour week.

Between grinds, 75,000 pieces.

THE PRODUCTO MACHINE COMPANY  
960 Heustatonic Ave., Bridgeport 1, Connecticut

NEED PROMPT SERVICE?  
CALL YOUR NEAREST  
PRODUCTO ASSEMBLY BRANCH

For Precision Die Sets Fast Call . . .

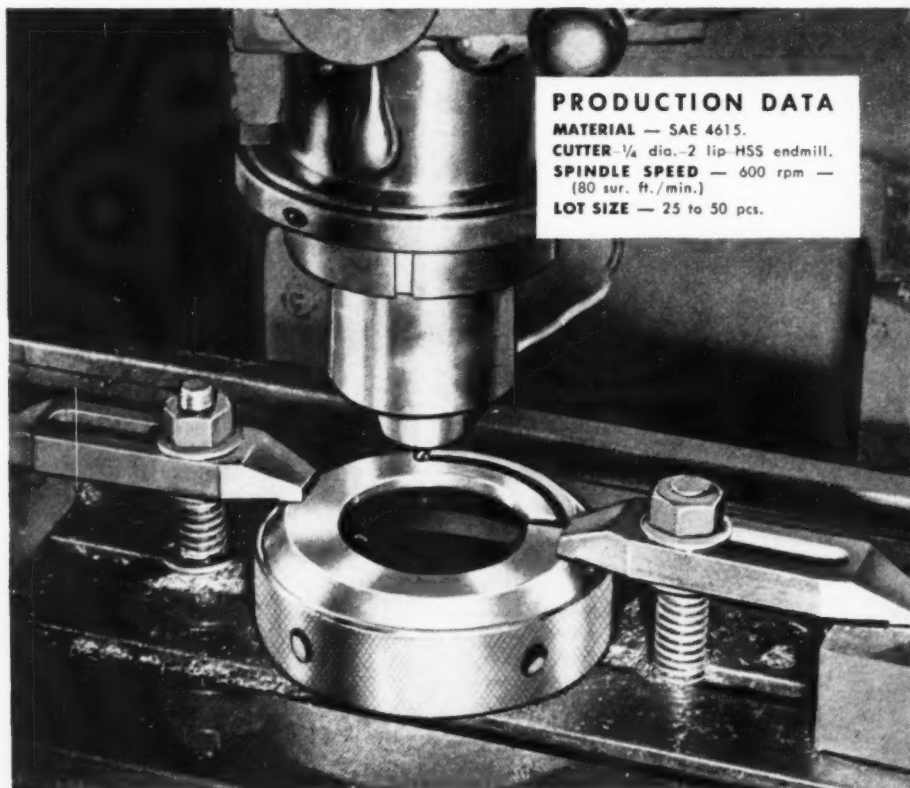


ALSO MAKERS OF TOOL AND DIEMAKERS ACCESSORIES, VISES, MACHINERY

3PD52B

May, 1953

# PRODUCTION TIME



## PRODUCTION DATA

**MATERIAL** — SAE 4615.

**CUTTER** —  $\frac{1}{4}$  dia. — 2 lip HSS endmill.

**SPINDLE SPEED** — 600 rpm —  
(80 sur. ft./min.)

**LOT SIZE** — 25 to 50 pcs.



(A) 6" (B)  $4\frac{1}{4}$ " (C)  $3\frac{1}{4}$ "  
(D)  $-1" + \pm .000$   
(E)  $-1" + \pm .005$  (F)  $\frac{3}{4}"$

**OPERATION 1** — Rough mill one side of tongue.

**PROCEDURE** — Offset spindle slide radius (A), set rotary head to angle (B), feed table to work-piece centerline (C to D).

**OPERATION 2** — Rough mill radius section between tongue.

**PROCEDURE** — Rotate head from angle (B) to angle (E).

# REDUCED BY 53%!

**Rotary Head Milling Machine simplifies method,  
cuts cost on still another production job.**



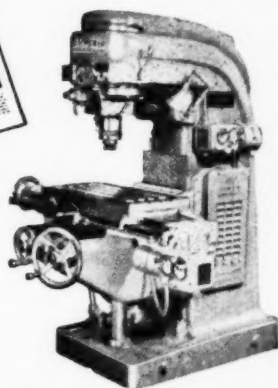
Here's the completed workpiece together with two pieces of waste.

**I**N the production milling of this Quick Change Clamp Collar, considerable savings were effected by using a Kearney & Trecker No. 2 Model D Rotary Head milling machine. The entire milling operation on each piece required less than 16 minutes and still maintained the prescribed accuracy. Previous time was 34 minutes.

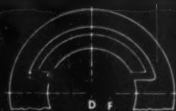
The job was done faster on the Rotary Head machine than would be possible with any other method. The radii were produced merely by offsetting the spindle slide and rotating the machine's head. The straight surfaces were milled by moving the table and saddle, both of which are independent of the head

setting. Only one cutter was used in this single set-up. Think of what this means not only in this job, but also in terms of increased range of operations for other work.

Get the Rotary Head Milling Machine Production Idea Booklet. It contains several examples of how this method has been found exceptionally efficient in solving production problems. It's yours for the asking. Write Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wis.



10



**OPERATION 3 —** Rough mill one side of opposite tongue.  
**PROCEDURE —** Feed machine table from (D) to (F).



**OPERATION 4 —** Rough mill end of tongue.  
**PROCEDURE —** Feed machine saddle from (F) to (G).

**OPERATION 5 —** Rough mill second half of inner contour.  
**PROCEDURE —** Repeat Operations 1 through 4, working area to be in the lower half of opening.

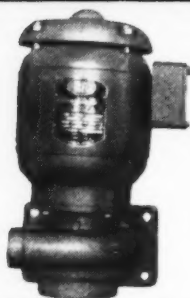
**OPERATION 6 —** Finish mill  $4\frac{3}{4}$ " dia., end of tongues to  $3\frac{1}{4}$ " dimension and width of tongues to  $1" \pm .000$  — .005.  
**PROCEDURE —** Reverse sequence of Operations 1 through 5.

• COOL TOOLS WORK BETTER, LONGER

COOL TOOLS BEST WITH



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Flanged mounts;  $\frac{1}{4}$  hp.;  
30 gal. per min.  
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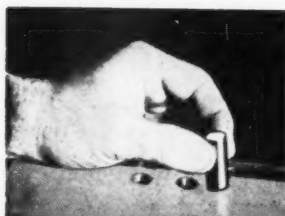
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1 hp 90 gpm

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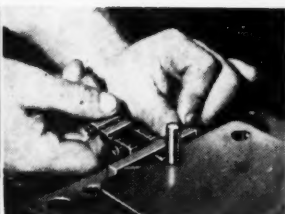
FULFLO MECHANICAL DATA BOOK



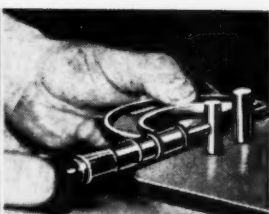
**THE FULFLO SPECIALTIES CO. Inc.**  
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**Check hole sizes**



**and locations,**



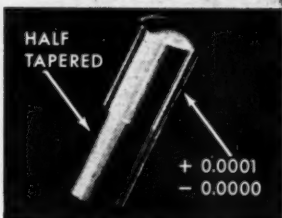
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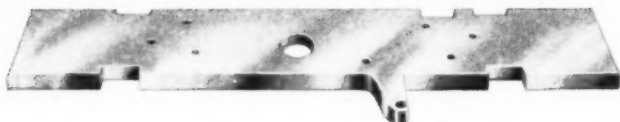


**"200,000 – where we could  
only get runs of 1 to 15,000!"**

says JOHN J. FUSCO, Consulting Engineer  
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**STRAIGHTGROUND • WHIPSLEEVED**

**increase production 1200%!**



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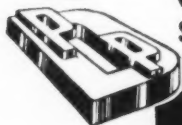
"Pivot Punches cost us about one-half the price of our own and we have realized savings of from \$75.00 to \$150.00 per month on maintenance."

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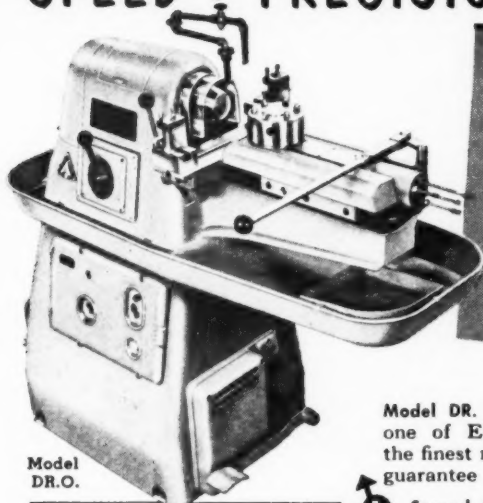
SEND for large FREE catalog and standard prices TODAY. Write dept. MT

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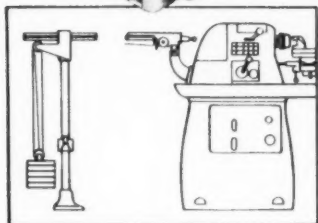
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Model DR. O. was developed and perfected in one of Europe's most modern plants where the finest machine tools and years of experience guarantee a high-precision product.



①

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②

## Hand Operated Screw Machine

For bar work up to  $\frac{3}{4}$ " dia. x 4" length.

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Headstock and Bed are one piece casting.  
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Spindle speeds 12 — forward and reverse.  
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Three speed motor — 1,  $1\frac{1}{4}$  and  $2\frac{1}{2}$  H. P.



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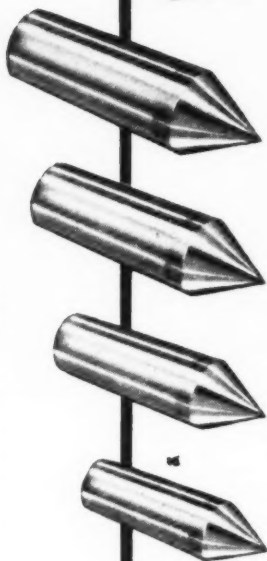
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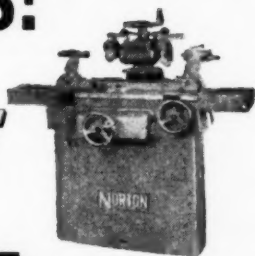
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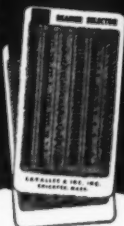
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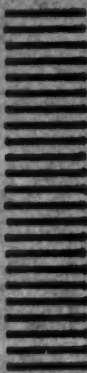
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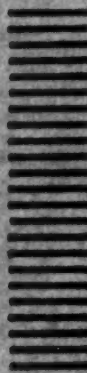
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4	14	24	34	44	54
5	15	25	35	45	55
6	16	26	36	46	56
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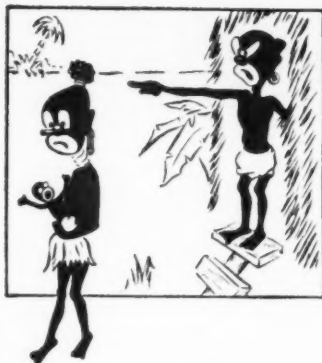
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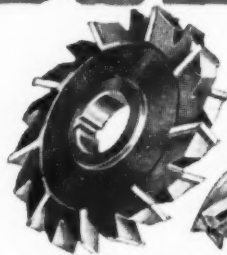
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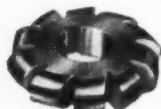
Side Milling Cutter,  
Staggered Tooth  
H.S.S. with Step  
Tooth.



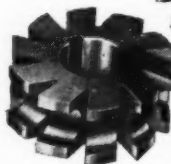
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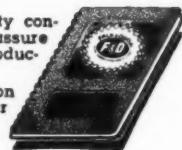
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The F & D Cutter line is stocked by leading distributors in your area.

Write the factory for our new No. 12 Catalog and current resale price list. Include request for current stock list.

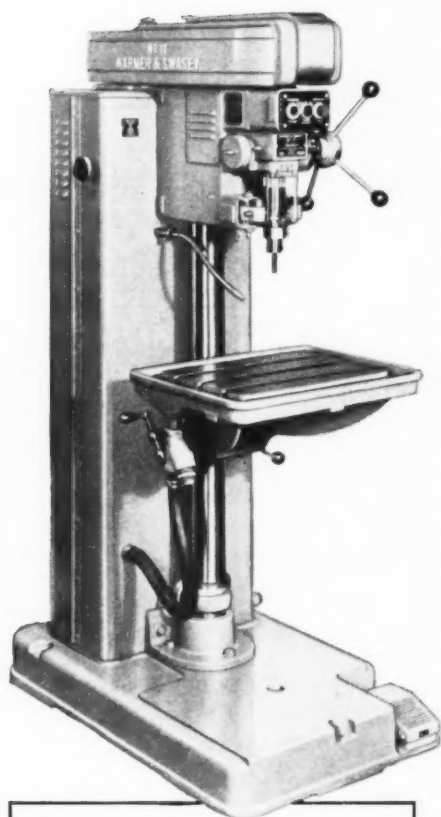


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**THE F & D MACHINE AND TOOL WORKS**

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# Having trouble with class 3 and 4 threads?



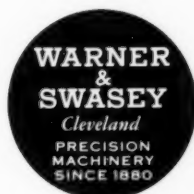
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No. 10	0-80 to 10-24 Capacity
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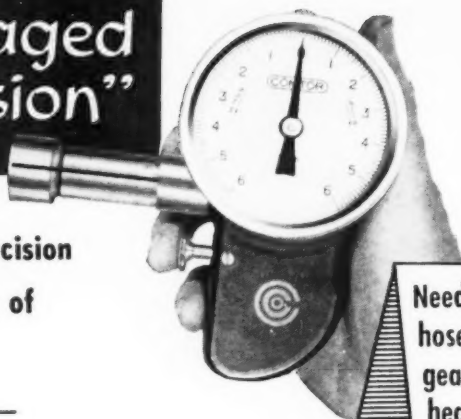
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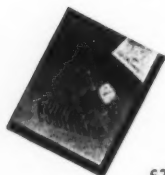
**Measures high-precision holes to fractions of .0001", with these advantages—**



**Needs no wires  
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gear or  
heavy base**

Here in a compact self-contained unit, you have the high precision that has found so prominent a place in the jet engine program. By unique design, Comtorplug gives you true 2-point gaging, self-aligned and centered. Thus it enables you to check any part of a hole—including very bottom—detecting out-of-round, front or back taper, bell mouth, etc.

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- Shows actual measurement to fraction of .0001", and is "just right" for Statistical Quality Control programs.
- No skill needed to use it accurately—built-in features and 10 minutes' instruction do the trick.
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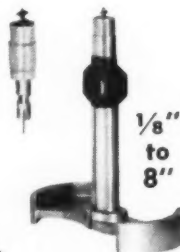


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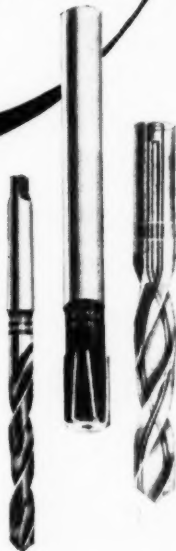


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specify "Double Circle"  
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The outstanding performance and long life associated with Double Circle Tools doesn't just happen. It is the result of exacting inspection to secure top quality. This inspection and quality check includes every individual tool. It starts with raw material . . . and is carried out on every manufacturing operation until the tool is checked out, finished and perfect . . . a precision product meeting rigid above-average standards.

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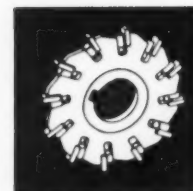
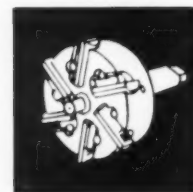
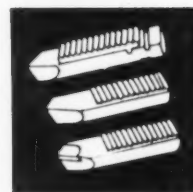
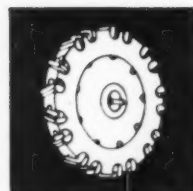
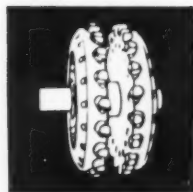
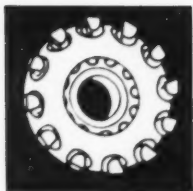
### **CHICAGO-LATROBE**

411 W. ONTARIO ST. CHICAGO 10

**DRILLS • REAMERS • COUNTERSINKS • COUNTERBORES • CARBIDE TOOLS • SPECIAL TOOLS**

May, 1953

69



# 8 REASONS WHY...

## Lovejoy Cutters are your best buy!

Lovejoy milling cutters offer eight important advantages which help you achieve maximum accuracy, dependability, production and profit from your milling machines.

- 1 All Lovejoy cutters are insert-tooth type. Only worn out blades need be replaced — not the entire cutter.
- 2 Serrations are on front of each blade — plain back makes full contact with body.
- 3 Positive-locking device on the blades assures rigidity, even on heavy intermittent cuts.
- 4 Advancing, replacing and sharpening of blades is fast and accurate.
- 5 Extra rugged blade and body design assures maximum results.
- 6 H. S. S., alloy and carbide-tipped blades available promptly from stock.
- 7 Lovejoy design is tops for blade interchangeability.
- 8 Lovejoy has had 35 years of experience — can help you get best results from your milling operations.

Write for free catalog!



136 MAIN ST., SPRINGFIELD, VERMONT

# LOVEJOY

## TOOL COMPANY, INC.

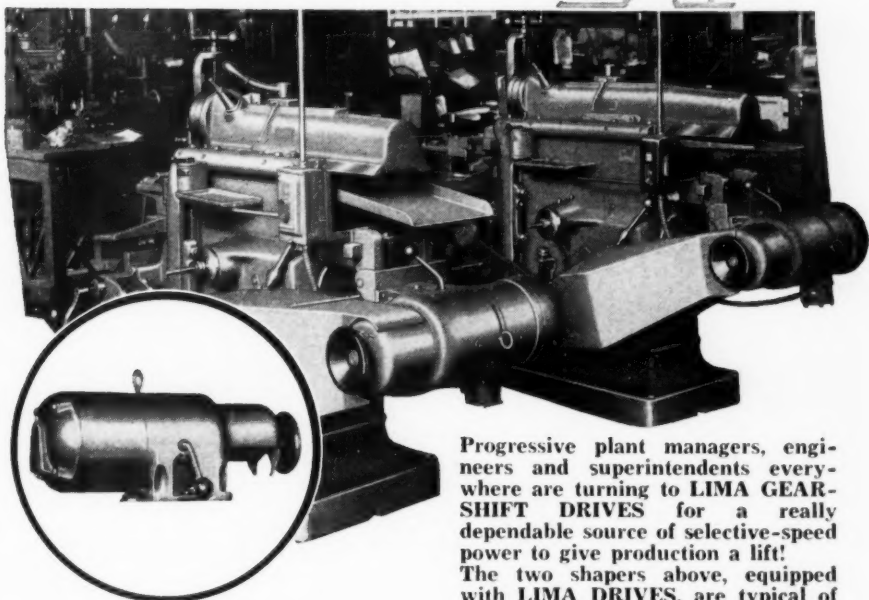
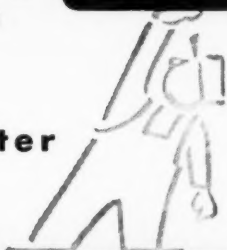
# LIMA

production  
gives

a

# LIFT

at International Harvester  
Company Plants



#### LIMA GEARSHIFT DRIVES

Available for prompt delivery in  
constant-horsepower ratings of  $\frac{1}{2}$  to  
15 HP. Four or eight speeds.

Progressive plant managers, engineers and superintendents everywhere are turning to LIMA GEARSHIFT DRIVES for a really dependable source of selective-speed power to give production a lift!

The two shapers above, equipped with LIMA DRIVES, are typical of the many different types of machines Lima has individually motorized at the Fort Wayne Works of International Harvester Company.

Let Lima survey your machines—get the production advantages you want.

WRITE FOR LITERATURE

*Representation in principal cities*

## GEARSHIFT DRIVES & MOTORS

THE LIMA ELECTRIC MOTOR COMPANY



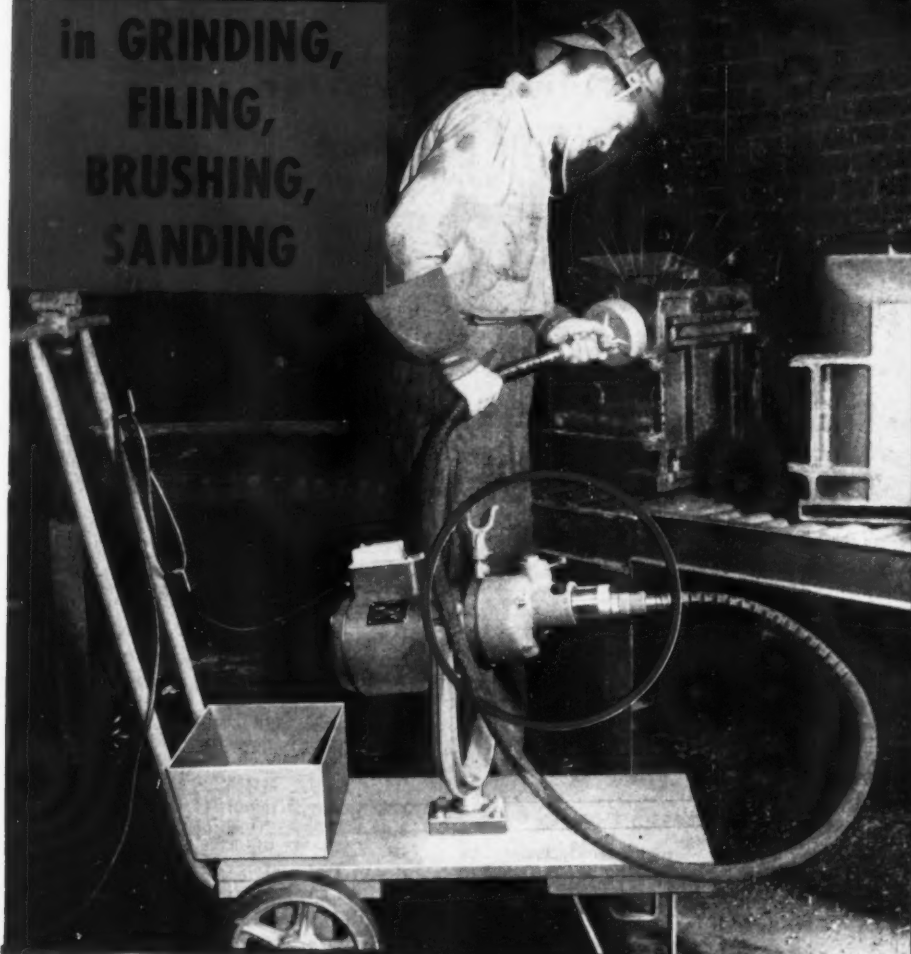
260 Findlay Road

• Lima, Ohio



# LESS OPERATOR FATIGUE

in GRINDING,  
FILING,  
BRUSHING,  
SANDING



**Strand**  
FLEXIBLE SHAFTS

**FLEXIBLE  
SHAFT MACHINES**  
"the Finest in the Field"

# when you use the *Strandflex*

## 4-SPEED GEAR-DRIVE FLEXIBLE SHAFT MACHINE!

No heavy, bulky motor to hold during work! All you lift is the lightweight hand-piece and working attachment. That means less operator fatigue, higher production, *fewer rejects*, better employee morale!

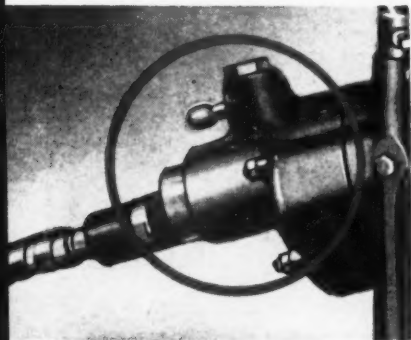
### Wide Range of Uses

You can use your Strandflex machine for grinding, brushing, filing, drilling, sanding, buffing or polishing . . . merely by changing the working attachment.

### Wide Range of Speeds

Your Strandflex is available in two 4-speed ranges: 850-1800-3600-4500 RPM or 1700-3600-7200-9000 RPM. You can switch to any of four speeds with little more than the flick of a finger and without using tools! No time-wasting, knuckle-scraping pulley changing!

Strandflex 4-Speed Gear Drive Flexible Shaft Machines are available in  $\frac{1}{4}$ ,  $\frac{1}{3}$  and  $\frac{1}{2}$  HP in bench, floor or overhead mounts. Any unit is completely portable, ruggedly built for years of long, hard use.



- **Patented STRANDFLEX GEAR DRIVE UNIT** is enclosed . . . thus protected from dirt, grit or foreign matter. Heavy-duty gear lubricant assures smooth performance under toughest conditions for long years of duty.

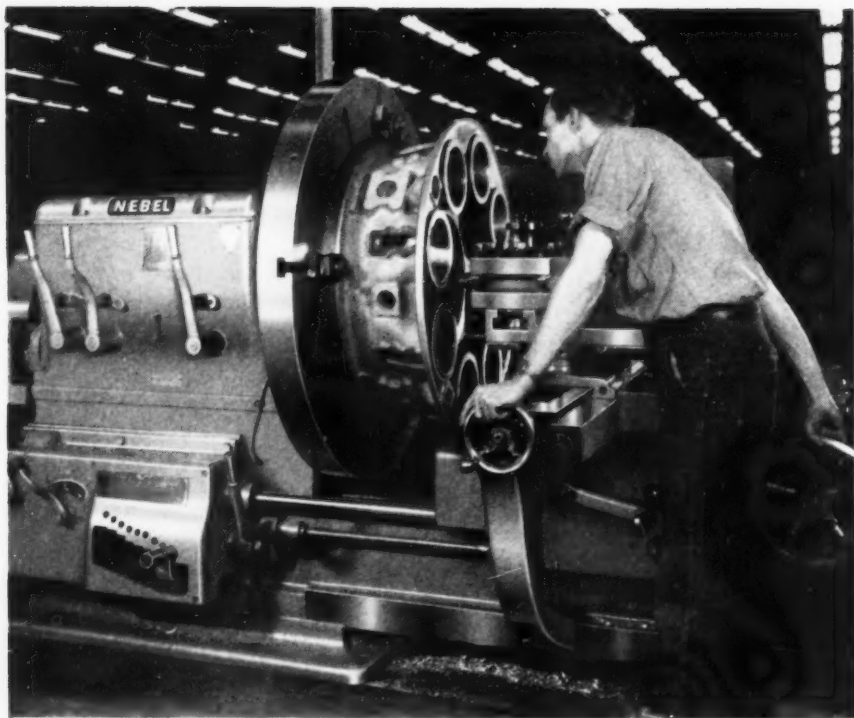
See your industrial supply house for a demonstration or write direct for information on the full Strand line—Strandflex as well as conventional direct drive and countershaft Strand Flexible Shaft Machines up to 3 HP. Ask for Catalog 231-A.



manufactured  
and marketed  
by

## FRANKLIN BALMAR CORPORATION

M. L. STANLEY DIVISION  
Woodbury, Baltimore 11, Md.  
ASST. 10, Wabash, Chicago 40, Ill.




## **Speed and Accuracy count at G.E.'s jet engine plant**

**TOUGH JOBS ARE EASY WORK** for Nebel extension bed gap lathes . . . with their flexible swing and center distance capacity. The Nebel "G" series shown above — machining a hard-to-handle compressor rear frame — is one of several on the job at General Electric's jet engine plant in Cincinnati.

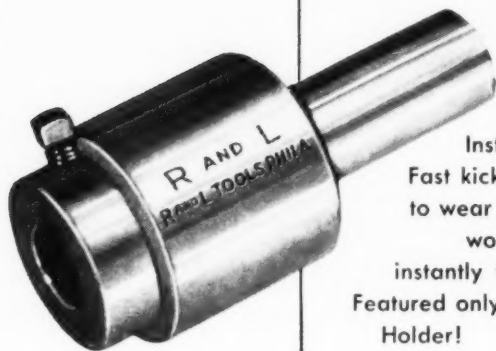
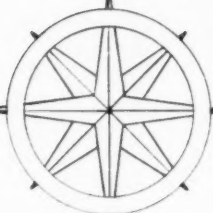
**MORE LATHE... LESS MONEY.** Nebel lathes give you the speed, power, stamina and accuracy you need at minimum cost. They're ideal for production and maintenance requirements. Available in heavy duty engine, removable block gap and extension bed gap models . . . in swing sizes from 16" to 50".

*basic... economical... dependable*

Write today for descriptive literature. The Nebel Machine Tool Co., Cincinnati 25, Ohio, U.S.A. Members of the National Machine Tool Builders' Association.

**Nebel**  

*the workhorse of the  
metalworking shop since 1899*

# fast!



## **THE R AND L TAP AND DIE HOLDER**

Instant engagement at full contact!  
Fast kick out clutch! No spring plungers  
to wear or break! No small screws to  
work loose! Right to left threading  
instantly with new release mechanism!  
Featured only in the R and L Tap and Die  
Holder!

Write for complete  
catalog of R and L  
products

**RIGHT R and L LEFT TOOLS**  
1825 BRISTOL STREET • PHILADELPHIA 40, PA.

TURNING TOOL • TAP AND DIE HOLDER • UNIVERSAL TOOL POST • TURRET BACKREST HOLDER • CUT-OFF BLADE HOLDER • RECESSING TOOL  
RELEASING ACORN DIE HOLDER • REVOLVING STOCK STOP • FLOATING DRILL HOLDER • KNURLING TOOL • CARBIDE AND ROLLER BACKRESTS

*Announcing* **THE NEW WELLS Model 800**  
**Horizontal Metal Cutting**  
**BAND SAW**



THE NEW WELLS MODEL 800 is the first metal cutting band saw designed to capitalize on the remarkable advantages, and to be approved for use with the new MILFORD REZISTOR High Speed Steel Band Saw Blade.

Model 800, engineered for heavy duty work, provides for practical and efficient use of blades of 1" in width, especially the new High Speed Steel Band Saw Blade. This blade, used with Wells Model 800, has established new records . . . higher level of cutting efficiency . . . more cuts per blade.

Wells Manufacturing Corporation has been authorized by the producers of this new blade to supply complete information, and would be glad to study your metal cutting jobs to determine which blade, when used with Model 800, will show you cost savings in your cut-off operations.

Approved  
 for use with  
 the revolutionary  
*NEW*  
**MILFORD REZISTOR**  
**HIGH SPEED STEEL**  
**BAND SAW BLADE**

Designed for production  
 cut-off work, partic-  
 ularly for cutting  
 stainless steel

**DESIGN FEATURES**

- Exclusive new Wells "constant-load" blade tensioning device.
- Extra rigid, heavily built counter-balanced frame and beam.
- New style band wheels.
- Synchronized speed blade cleaning brush.
- Improved, special heavy duty blade guides.
- New expanded range of cutting speeds.
- Capacity: 8" diameter.

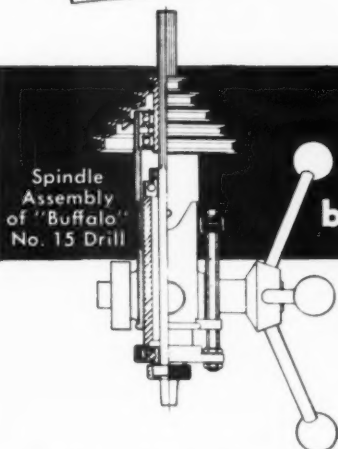


*The Pioneers of Horizontal*  
**METAL CUTTING**  
**BAND SAWS**

WELLS MANUFACTURING CORPORATION  
 707 COOLIDGE AVE. • THREE RIVERS, MICH.

**"Buffalo"**

# Tips on Better DRILLING



**JUDGE HOW A  
DRILL WILL PERFORM  
by its SPINDLE ASSEMBLY**

In judging a drill, so much depends on the spindle—the accuracy, the ease of handling, serviceability and long life of the drill.

This diagram of a "Buffalo" No. 15 Production Drill spindle shows why. The spindle is alloy steel, accurately machined, ground and polished—smoothly turning on sealed-for-life ball bearings and free of end play.

For further ease of handling and accuracy, the spindle drive pulley runs on two precision ball bearings, and is broached to fit the 6 spindle splines so accurately that up-and-down sliding action of the spindle is free of play, yet practically frictionless. The handy 3-spoke feed and adjustable spring return reduce operator fatigue. Why not look into this line of drills built essentially for easy, accurate, low cost work? Write for recommendations on your drilling problem!



**No. 15-M  
DRILL**



**"Buffalo"**  
**BUFFALO FORGE COMPANY**  
161 MORTIMER ST. BUFFALO, NEW YORK  
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

MACHINE TOOLS

**DRILLING PUNCHING SHEARING CUTTING BENDING**

# Cooley ELECTRIC HEAT TREATING FURNACES

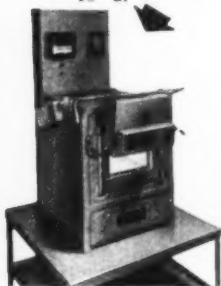
## 31 MODELS—A Complete Source of Small Heat Treating Furnaces

Cooley Heat Treating Furnaces are used for heat treating operations from 300° F. to 2500° F.

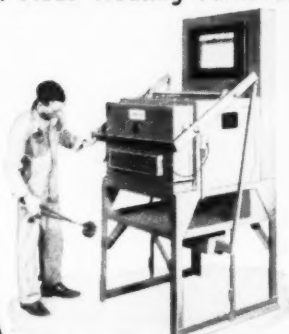
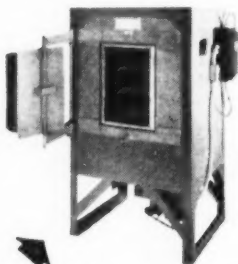
A special Cooley feature is a package unit comprised of furnace and integrally wired control panel, incorporating pyrometer, line switch and fuses—all completely factory wired.

Indicating controlling Pyrometers are available with all Cooley Furnaces.

**Bench Type** — For tools and small parts — to 2000°F 14 models and sizes to 10" w x 8" h x 18" d.



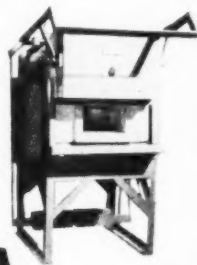
**Industrial Box Furnace** — General heat treating — to 2000°F 4 models and sizes to 15" w x 12" h x 30" d.



**Recirculating Air Draw** — Box type for controlled heating to 1250°F — steel tempering, glass annealing, etc. 5 models — sizes to 24" w x 15" h x 48" d.



**High Temperature Box Furnace** — For high speed steel treating to 2500°F — 3 models and sizes to 12" w x 8" h x 24" d.



**Recirculating Ovens** — for drying, finishing and industrial processing to 600°F—5 models and sizes to 36" w x 36" d x 60" h.

Write for Catalog and Complete Details

Cooley

**ELECTRIC MFG. CORP.**  
36 SOUTH SHELBY STREET  
INDIANAPOLIS 7, INDIANA



# Doing the Hole Job —

Better, Faster, at Lower Cost

With

## BESLY

The World's Most Accurate

## TAPS

• LET US PROVE that Besly can help you get better threaded parts, longer tap life and lower tapping costs.

Ask your authorized Besly Distributor for a TRIAL RUN on your toughest jobs . . . PLUS details on Besly's Super-Service on "Specials".



### BESLY-WELLES CORPORATION

Established as Charles H. Besly & Co. in 1875  
122 Dearborn Ave. • Beloit, Wisconsin

BESLY Drills, Reamers and End Mills—High-Speed Cutting Tools in a complete range of types and sizes.

#### UNSURPASSED ACCURACY AT ALL VITAL POINTS



Microcentric CHAMFER



Accurate  
RAKE ANGLE



Solid-Ground THREAD FORM



Mirror-finish  
FLUTES



Tru-Square DRIVER

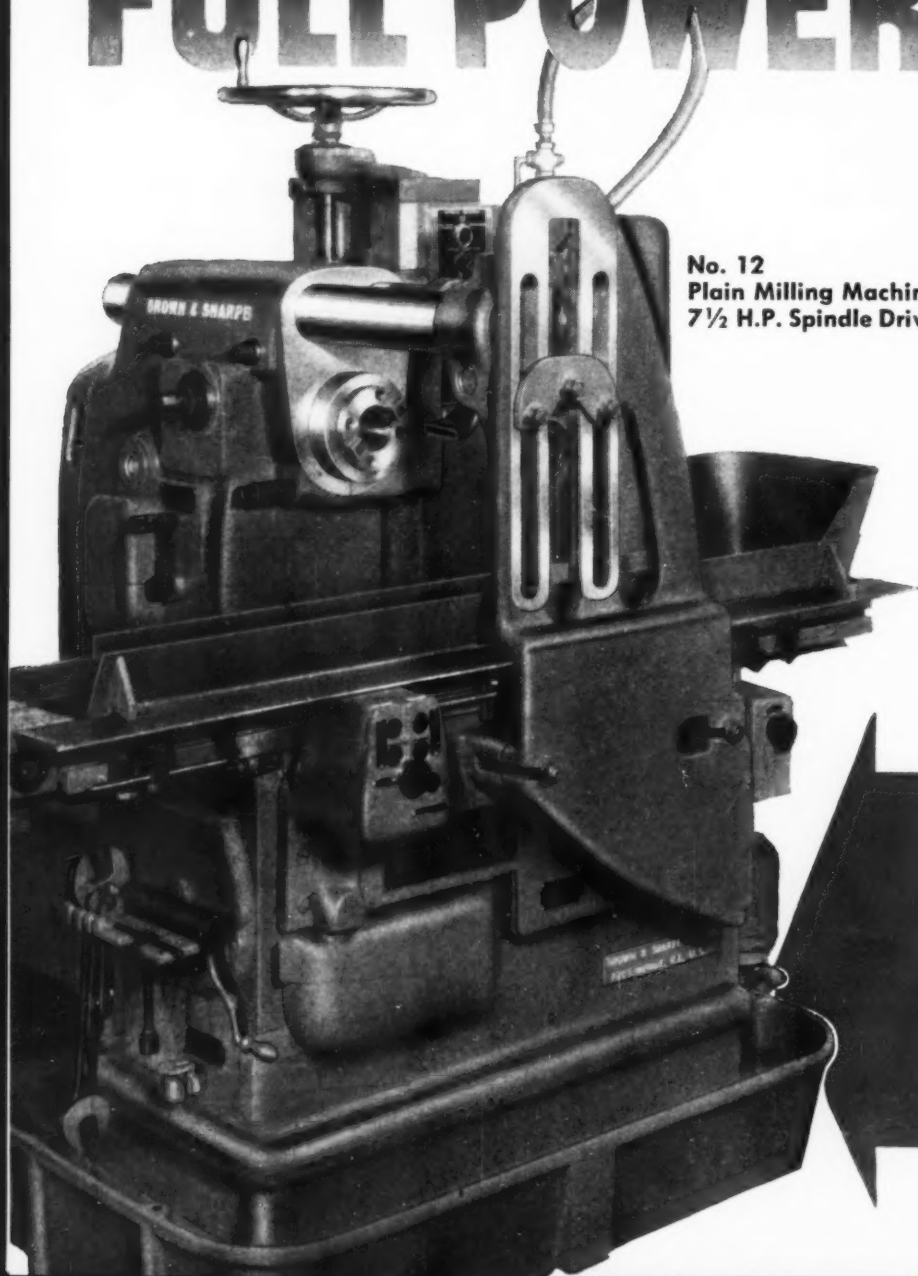
#### TAP TIPS

The handy "Handbook for Tap Users" is full of information on tapping methods and tap selection. Write for your Free Copy.



# FULL POWER

**No. 12  
Plain Milling Machine  
7 1/2 H.P. Spindle Drive**



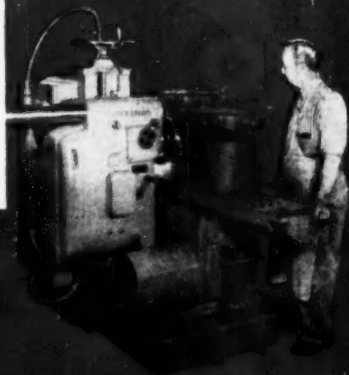
# **... 7½ h.p. at the spindle for extra fast milling on long and short run jobs**

Through extra power and simplified operation, this machine gives you important competitive advantages for meeting today's high production schedules.

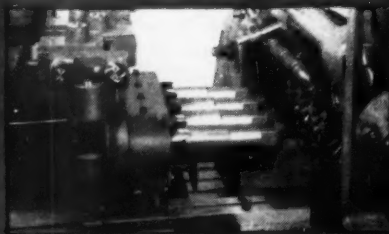
It allows you to take heavy cuts at fast feeds on a wide variety of medium-sized work . . . quick set-ups are assured by many time-saving features. Dual feed rates, a variety of automatic cycles, and the ability to climb mill in either direction are just a few of its advanced conveniences. Write for complete details on the powerful No. 12 Plain Milling Machine — 7½ H. P. Spindle Drive. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.



**POWERFUL CUT.** Steel forging is 5" wide and after removes ¼" of stock at a fast feed. Unique high ratio gearing makes faster cutting possible.



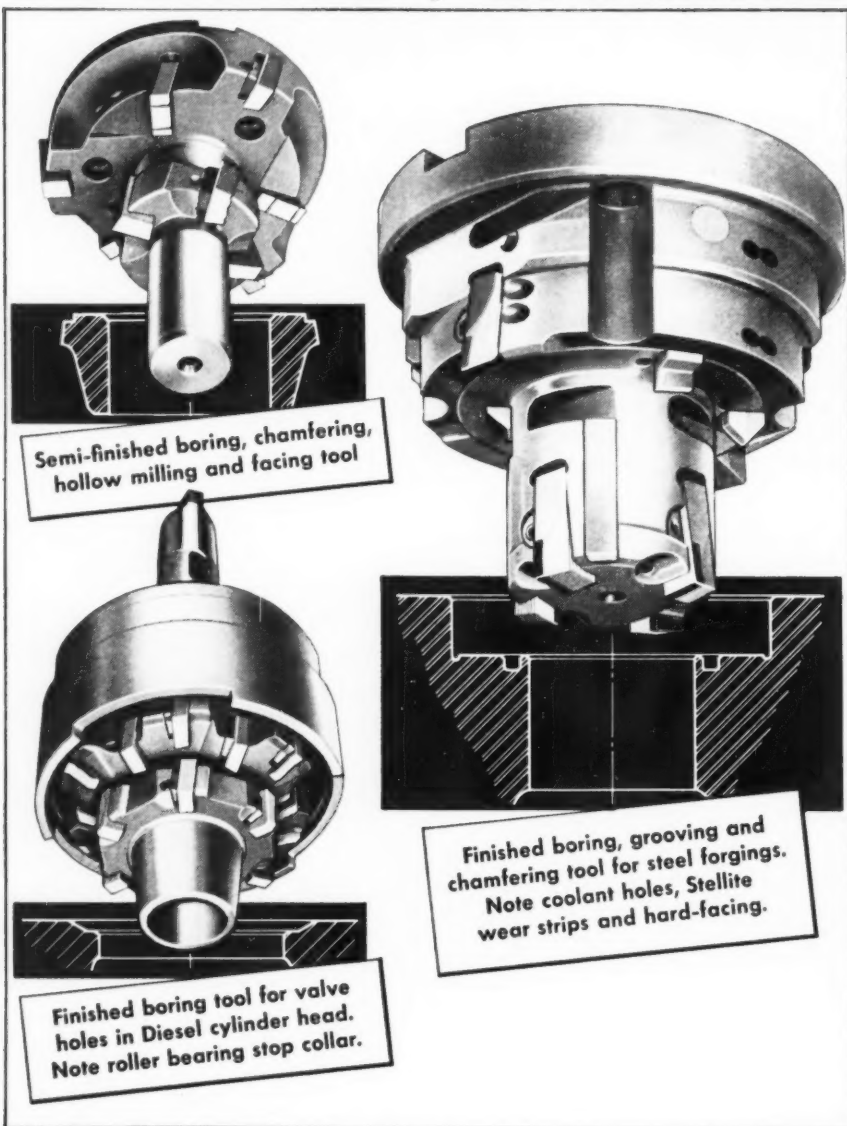
**HIGH SPEED MILLING.** The powerful No. 12—7½ h.p. spindle drive, permits taking full advantage of the faster feeds and speeds possible on many medium-sized carbide milling jobs.



**SPECIAL FIXTURES** make the No. 12 a still higher production machine. Brown & Sharpe Engineering Services are available to you for special applications.

## **Brown & Sharpe**

# TOOLING *by* GAIRING



**The GAIRING TOOL COMPANY • 21228 Hoover Road • Detroit 32, Mich.**



## INDIVIDUAL VULCAINAIRE DUST COLLECTING UNITS

Are used on surface and other grinders where grinding dust must be removed.

Inexpensive, compact units, with no moving parts.

Operated from your present air supply.

Installed in a few minutes, eliminating need for costly centrally located dust collecting systems.

The collector element is mounted on the side of the machine. Quickly cleaned, requiring no refills.

Vac-suction pick-up device (vacuum nozzle) is mounted on the grinding wheel guard or close to grinding wheel on other applications. This mounting permits constant contact with dust as the wheel is moved up or down.

A simple needle valve operates the unit, and can be shut off whenever the machine is not in use.

Available in two sizes: 700 series for grinding wheels 7" dia. or less—200 series for wheels 2" dia. or less.

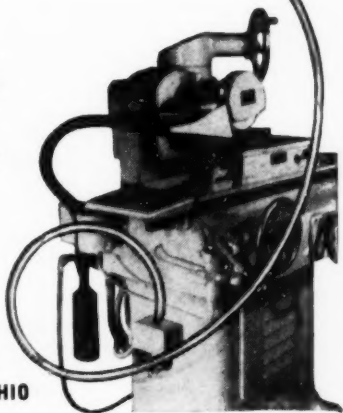
Made by the makers of Vulcanaire The jig grinding attachment.

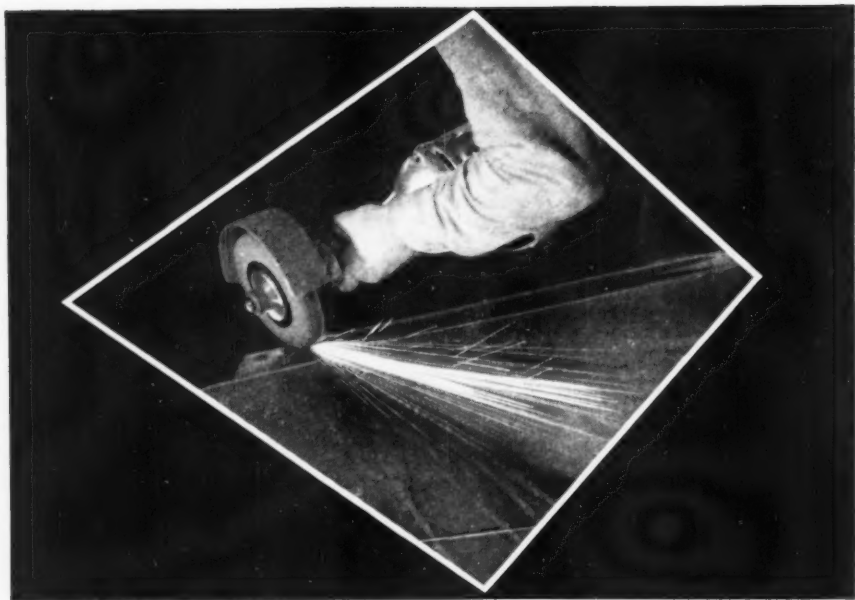
*Write on your letterhead  
for "Dust Collector" Booklet.*

### **VULCAN TOOL CO.**

HIGHLAND AND LORAIN

DAYTON 10, OHIO





## ***Manhattan Portable Wheels— More use per dollar***

**DESIGNED BY YOU . . .** Manhattan Portable Wheels are built to solve the specific problems encountered in your plant . . . to remove *more* metal . . . *faster* . . . at *lower* cost. Yes, the type of abrasive, grain size, hardness, structure and bond of the Manhattan Portable Wheel you buy are determined by the specific requirements of your work . . . by a careful analysis of *your* needs.



This is typical of Manhattan service . . . of Manhattan Abrasive Wheels . . . built with the job in mind. The result—uniform quality, longer life, and more output per man-hour. You get **MORE USE PER DOLLAR** when you specify "Manhattan".

**WRITE TO ABRASIVE WHEEL DEPARTMENT**



MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

**RAYBESTOS-MANHATTAN, INC.**

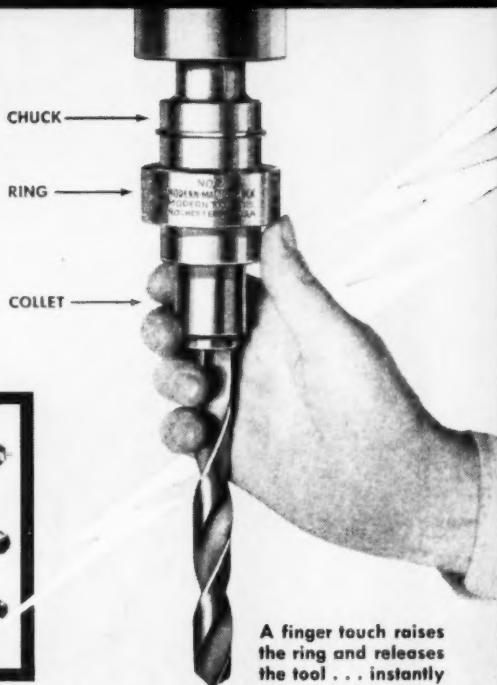
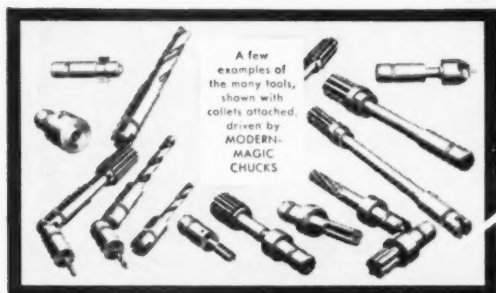
Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles • Teflon Products • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

MR-94CR

# Speed up your production

**Change tools without  
stopping . . . or even  
slowing the machine**

## **MODERN-MAGIC QUICK CHANGE CHUCK and COLLET EQUIPMENT**



**A finger touch raises  
the ring and releases  
the tool . . . instantly**

**Modern Precision Tools  
Include . . . . .**

**STATIONARY SELF-OPENING  
DIE HEADS  
ROTARY SELF-OPENING  
DIE HEADS  
STATIONARY  
COLLAPSIBLE TAPS  
ROTARY  
COLLAPSIBLE TAPS  
MODERN-MAGIC  
CHUCKS AND COLLETS  
SELF-OPENING  
STUD SETTERS  
INSERTED BLADE  
FACE MILLING CUTTERS  
SOLID ADJUSTABLE  
DIE HEADS  
ADJUSTABLE HOLLOW  
MILLING TOOLS  
UNIVERSAL CHASER  
GRINDING FIXTURES**

Modern-Magic Quick Change Chuck and Collet Equipment virtually eliminates costly lost time of revolving spindle machines. Used with such machines, tools are changed without stopping or even slowing the spindle. Changes are made from drill to reamer to tap instantaneously and safely while the machine is running at cutting speed. In this way, the Modern-Magic Chuck and Collet Equipment gives multiple spindle range to single spindle machines, increasing production and cutting cost. In high production shops, it has been proved they save time even though used only for changing from dull to sharp tools.

For full information, send for Bulletin M-103.  
In addition to standard Modern-Magic Chucks  
and Collets, it shows special types of each.

Only the ORIGINAL Modern-Magic Chuck and Collet Equipment carry the name  
"MODERN-MAGIC" and are manufactured by Modern Tool Works, Rochester, N.Y.

# **MODERN TOOL WORKS**

**DIVISION**

**CONSOLIDATED MACHINE TOOL CORPORATION**

**SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED**

**ROCHESTER, NEW YORK**



# SMALL CHUCKS FOR THOSE SMALL JOBS...

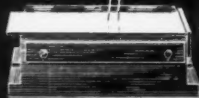
FIXTURES



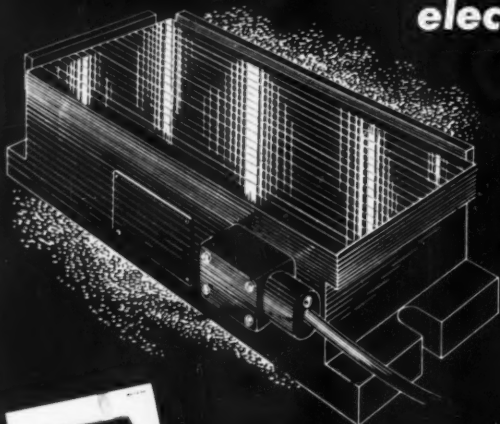
HAND SAWING



LAYOUT



## it's *Magna-Lock* electro-magnetic CHUCKS



Get details...  
**WRITE DEPT. MT-53**

5" x 10" ... 6" x 12" ...  
6" x 18" working sur-  
faces. Ideal for bench  
work, small machine  
tools. 22% more hold-  
ing power ... moisture  
proof ... other advan-  
tages of larger Magna-  
Lock Chucks. Complete  
with rectifier and switch  
for operation on A.C.  
voltage.

Price: 5 x 10 .....	\$125.00
6 x 12 .....	159.00
6 x 18 .....	225.00

IMMEDIATE DELIVERY.

*Magna-Lock*

*Hanchett* **MAGNA-LOCK CORPORATION**

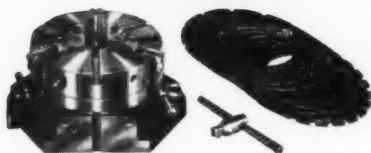
Magnetic Chucks and Devices

**BIG RAPIDS . . . MICHIGAN, U. S. A.**



**ELIMINATE  
EXPENSIVE  
JIGS AND  
FIXTURES**

with  
**HARTFORD SPECIAL'S  
SUPER-SPACER**



12" Super-Spacers come complete with 48 notch Master Index Plate, eight mask plates for 2, 3, 4, 6, 8, 12, 16 and 24 divisions. Socket wrench included. Special index plates can be furnished.

This versatile indexing device, the 12" Super-Spacer, is ideal for many types of machining on either long or short runs. It is ruggedly constructed for long foolproof operation, yet is fast and accurate. Through hole permits use of a centering plug or passage of work up to 4" in diameter. The Super-Spacer is also available in the familiar 8" size. To up your production, write for new Bulletin.

**When it comes to production —**

**AUTOMATIC  
DRILLING  
& TAPPING  
MACHINES**



**AUTOMATIC  
THREAD  
ROLLERS**



**HARTFORD**  
*Special*

**THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.**

# *Lusol* IS MORE THAN A COOLANT ...it's a Service

Sometimes a smart coolant salesman can make minor adjustments on a machine tool, which enable him to speed up its operations. Then he says, "Look what *our* coolant has done for you! Use it on all your machines."

Lusol service engineers don't depend on such sketchy performance to prove-in their product. They clean out the machine you have assigned for the initial test, then install Lusol in proportions that are proper for the task involved. They draw on their extensive tooling experience to help you get the most out of that machine.

Foremen and operators see what Lusol is accomplishing there — faster speeds and feeds, finer finishes, longer tool life, smoke-free atmos-

phere, freedom from skin irritation. They say, "Let's try Lusol on that job, too. It's a tough one." And so the use of Lusol spreads, not through sales pressure, but from within each user's organization.

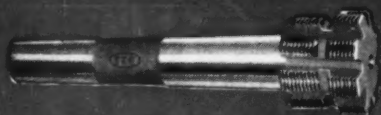
## **"Will Lusol work in my plant?"**

The fact that Lusol *works* on turning, milling, grinding, drilling, roll-forming and so on has been demonstrated time after time. We can cite hundreds of case histories testifying to that. Now the question is, "Can your machines take full advantage of what Lusol has to offer?"

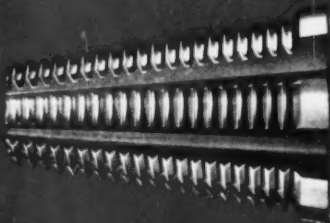
Write for the booklet, "Lusol Gets to the Point," for evidence of its time- and money-saving ability. Then ask to have our representative call; he will make the necessary arrangements to prove-in Lusol at your plant.

**Send for a free copy of the booklet  
"Lusol Gets to the Point"**

**F. E. ANDERSON OIL COMPANY, INC.**  
**Box 217-K, Portland, Connecticut**



Ground shank type thread milling cutter for threading two diameters at the same time.



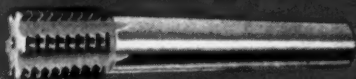
Tapered, shell type multiple thread milling cutter.



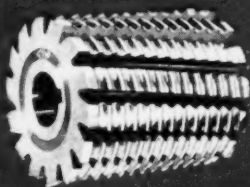
**MULTIPLE THREAD MILLING CUTTERS** by CONTINENTAL are precision ground to produce accurate threads with a fine finish. They're form-relieved so that they can be sharpened easily by grinding the faces of the cutting edges without altering the form. They're made of the best type of high-speed steel, hardened under accurate control in our own shop.

Call in your local Ex-Cell-O representative—or send a tool or part print directly to Continental in Detroit for a quotation.

# TO MILL *Precision* THREADS ON PRODUCTION PARTS



Continental shank type high-speed steel ground thread milling cutter.



Shell type multiple thread milling cutter for machining a special radius form.

53-15

## Continental Tool Works

DIVISION OF EX-CELL-O CORPORATION  
DETROIT 32, MICHIGAN

It takes only a **Jiffy**  
to pack it right...  
to ship it fast...



Whether you ship  
spare parts, tools,  
accessories, precision  
instruments or other products  
of semi-fragile or non-fragile  
nature—you need only JIFFY  
PADDED SHIPPING BAGS for complete packing protection.

Consider the savings effected in using JIFFY PADDED SHIPPING BAGS.

**Time and Labor**—the entire packing operation is reduced to 3  
simple steps.

Insert item—Fold along scored line—Staple or Tape.  
**SAVE UP TO 76% IN PACKING TIME!**

**Packing Material Costs**—stock JIFFY BAGS and eliminate  
the need for corrugated boxes, fillers, overwraps  
and twine. JIFFY's built-in expansion cushioning  
hugs contents tight, absorbs shocks in  
transit. Its patented construction prevents damage  
due to moisture, dirt or dust.

Available in 8 standard sizes.

**Free samples on request.**

Distributors in 43 principal cities.

Jiffy Bags meet Military Spec-  
ification MIL-B-4604 (USAF).

**JIFFY MANUFACTURING COMPANY**

374 FLORENCE AVENUE ★ HILLSIDE, NEW JERSEY

## *This man is running* **SIX** *drill presses*

He is performing six consecutive drilling operations with a single jig at a single working station, with less handling time, and without changing tools. He is using the Lign-o-matic turret on a standard drill press.



### **PUT THE LIGN-O-MATIC TURRET IN YOUR SHOP FOR A FREE 10-DAY TRIAL... IT WILL...**

**INCREASE PRODUCTION** — Many users report more than 300% greater output in actual production. Turret indexes faster than tools can be changed or work moved to another spindle.

**CUT COSTS** — patented self-centering principle guarantees accuracy equal to drill press spindle. Lign-o-matic

reduces tool and jig wear, cuts worker fatigue; adds up to faster work with fewer rejects. All parts completely guaranteed for TWO YEARS against defective manufacture.

**PRICE** — Model D, 6 spindles with No. 2 Jacobs male taper ..... \$235.00

**DELIVERY** — Currently, 2 weeks.

**TRY IT YOURSELF** at our expense. If you are not fully satisfied for *any* reason, return turret within 10 days and pay nothing.



### **HOWE & FANT, INC.**

**539 FLAXHILL ROAD  
SO. NORWALK, CONN.**

- ☐ Please rush \_\_\_\_\_ Lign-o-matic turrets for (drill press make) \_\_\_\_\_ (size) \_\_\_\_\_ (quill dia.) \_\_\_\_\_ (spindle taper)
- ☐ Please send bulletin with complete information.

**MY NAME** \_\_\_\_\_

**TITLE** \_\_\_\_\_

(Attach coupon to company letterhead)

**INCREASES  
PRODUCTION...**

**LOWERS COSTS...**

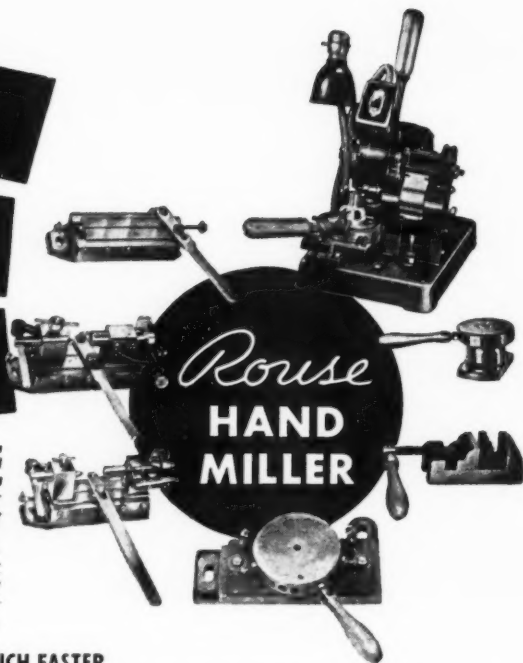
**PAYS FOR ITSELF  
QUICKLY...**

The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost. Only \$106.00\*

Fixtures (illustrated) extra.

Motor equipment:— $\frac{1}{4}$  H.P. 110 Volt AC 60 cycle, single phase, swivel motor mount and light — \$29.00\*

\* All prices FOB Chicago.



- ★ **MILLS SMALL PARTS MUCH FASTER.**
- ★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.
- ★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.
- ★ **NO MORE COSTLY SET-UP TIME.** \$106.00\* price so low that it pays to keep one or more Hand Millers always set-up for special operations.
- ★ **YOU GET A BETTER PRODUCT**—the result of ABSOLUTE ACCURACY.
- ★ **A LOSS BECOMES A PROFIT** when marginal pieces are finished on the Hand Miller instead of on high cost equipment.
- ★ **VERY LOW MAINTENANCE.**
- ★ **USED REGULARLY IN 1163 MANUFACTURING PLANTS** (some of which use as many as 30 machines)—yet on the market a scant few years.
- ★ **UNIQUE—VERSATILE.** Nothing else like it. One or several machines can be the answer to some of your production problems.

**Write today  
for further  
information.**

**H. B. ROUSE & COMPANY**

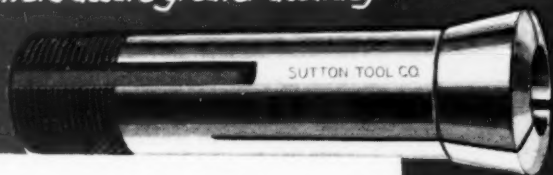
2214 N. WAYNE AVE., CHICAGO 14  
50 YEARS OF SERVICE TO INDUSTRY



# ARE YOUR LATHES LOSING THEIR GRIP?



*Sutton Collets assure greater accuracy!*



## Sutton Collets for lathes and milling machines feature —

**Accurate threads!** Threaded on special precision machines which assure clean and true concentric threads whose accuracy provides true alignment and greater life of the drawbar.

**Spring tempered!** Made from selected tool steel heat-treated to resist wear, and expertly tempered to maintain their spring and accuracy.

**Precision ground!** Ground inside and out. Accuracy of taper and concentricity of hole are insured by use of specially designed fixtures.

## Immediate Shipment of Collets For These Machines:

American, Amer, Allen,  
Anson, Capron, Cincin-  
nati, Clonting, Henday,  
Leland, Monarch, Rhett,  
Rockford, Seamon, Sher-  
den, Hagenbach, South-  
land, Springfield, Van  
Norden, Becker, Brown  
& Sharp 67 & 9 Taper,  
Berke 12 Morse Taper,  
Kearney & Trecker, United  
Milling Head.

**SUTTON COLLETS**  
**FEEDERS and TOOLS**

*Suttons Run as True as the Spindle*



Beautifully modern yet accessible — that's the No. 1218 Hydrabrasive! There's none of the so-called "modern design" that's only window dressing, with operating parts blocked by streamline covers. On the No. 1218 notice how the hydraulic pump and tank unit rolls out on wheels for easy servicing. Also note the convenient electric control panel that fully meets J.I.C. codes. These are only two examples of Abrasive unit design that means complete accessibility.

The No. 1218 is built for today's high production

grinding schedules. It speeds up all types of surface grinding, and its accuracy is a delight to operator and owner alike. Hydraulic operation provides table speeds from  $1\frac{1}{2}$  to 90 ft. per min., with  $\frac{3}{8}$ " of cross feed in  $1/5$  of a second. Specifications include: wide cross travel (12") and moderate table length (18"); saddle ball ways; and 5 HP spindle motor driving a standard 12" wheel. Write for latest complete catalog describing No. 1218 Hydrabrasive, Abrasive Machine Tool Co., 14 Dunellen Road, East Providence 14, Rhode Island.

**ABRASIVE**

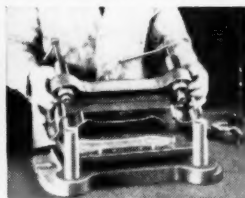
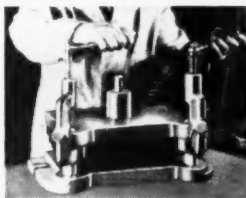
ACCURACY BOOSTS PRODUCTION

**Abrasive Quality is Reflected in the Finish of Your Product**

## Separate Die Sets This *Fast*, Simple Way...

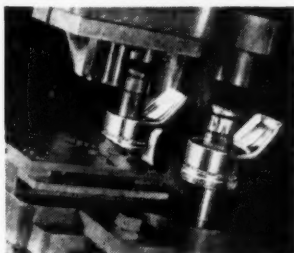


The principle of the Acro Die Set Puller is to remove the punch holder from the die shoe by a straight upward pull, whereby punch holder travels upward from die shoe axially, leaving both leader pins simultaneously. This is accomplished only by use of the indexed screw wrenches which act as indicators, controlling the upward travel. This is an exclusive patented Acro feature, found only in Acro Die Set Pullers.



## AND, Protect Leader Pins With These Efficient Oilers

Acro Pin Oilers fit over each leader pin and seal in place with a rubber neoprene washer. Each cup is filled with oil so each downward stroke brings bushing in contact with oil and each upward stroke distributes oil evenly over leader pins. Eliminate bushing wear, leader pin scoring, and maintain die accuracy. Die sets equipped with Acro Pin Oilers have run under tests for several weeks to a month without refilling.



## Free Data

Covering each of these and other profitable Acro accessories is included in our folder. Write for bulletin BB.

# ACRO

Metal Stamping Co.  
332 EAST RESERVOIR AVENUE  
MILWAUKEE 12, WISCONSIN

# WHAT'S THIS?

## HIGH SPEED

## 100% INSPECTION



**One machine is accurately checking 8 dimensions simultaneously—separating correct, oversize, and undersize parts at a rate of 2100 an hour.**



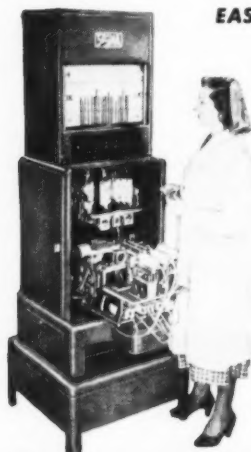
Two girls now handle an inspection job that formerly took six—and human errors have been eliminated.

Eight, standard Sigma gauges, like this one: have been mounted together for rapid, accurate inspection of mass produced parts. Each gauge, accurate to within .00005", measures one dimension. More (up to 30) or fewer gauges could have been used, depending on the number of dimensions to be checked. These gauges, with standard Sigma mounting units, and special fixtures where necessary, can be set up to inspect parts a fraction of an inch long, or several inches long, a foot, or longer.



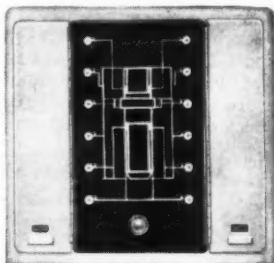
Depending on the arrangement, they can check internal and external diameters, length, depth, or other characteristics. The type of parts and the method of feeding determine inspection rates—hand feed: up to 600/hr.; semi-automatic: up to 900/hr.; fully automatic: up to 3500/hr. or more. Gauges are quickly and easily set to required tolerances and change-over from inspecting one type of part to another can be done within 10 or 20 minutes.

### EASY-TO-READ INDICATORS WITH SIGMA EQUIPMENT



The semi-automatic Turbine and Compressor Blade Inspector (left) is an excellent example of Sigma's solution for a difficult inspection problem involving 18 dimensions. Fixtures are replaceable—each machine can inspect a wide range of different type parts. Gauges are connected to a Liquicolumn Indicator which has tubes of colored liquid set beside graduated scales—liquid levels indicate actual sizes of dimensions being checked. Magnifications can be varied easily by the user. Alternate indicator (right) uses electrical signals—green light for acceptable parts, red lights indicate dimensions below tolerances, yellow lights for those over. Built-in counters tabulate the number of parts submitted for inspection and the number accepted.

Contact us and get details on the Sigma equipment best suited to your high speed, multi-dimensional inspection problems.



# COSA CORPORATION

405 Lexington Ave., New York 17

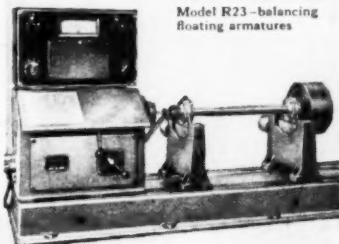
IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

Your source for all Precision Machine Tools—  
from Small Bench Lathes to Large Boring Mills

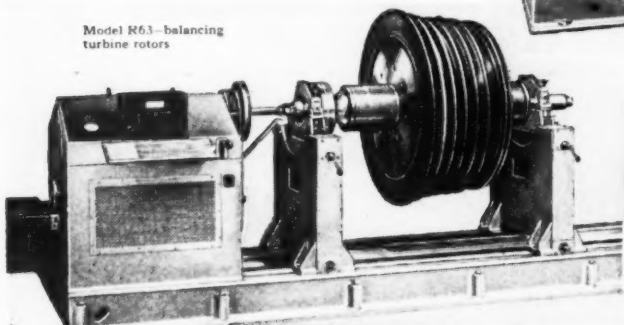
# PRODUCTION . . . BALANCING

## WITH SCHENCK ELECTRO-DYNAMIC BALANCING MACHINES

Now, in a fraction of a minute and in a single run, you can accurately determine the amount and location of dynamic and static unbalance on rotating parts. The SCHENCK Electro-Dynamic Balancing Machine has a sensitive and accurate electrical measuring system—without electronic tubes or oscillograph—that will indicate unbalances caused by displacements as little as 0.00004" from the center of gravity. Simple and easy to operate, the SCHENCK Balancer, by coordinate measurement, quickly indicates on a Wattmeter the unbalance of the rotating part.



Model R23—balancing floating armatures



Model R63—balancing turbine rotors

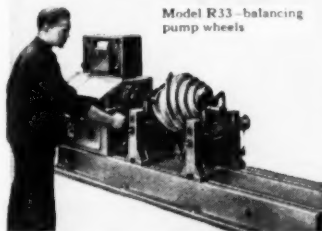
The workpiece is balanced easily by adding or removing weight units at two of the four balancing points located within the coordinates, 90 degrees apart. For many production installations, Schenck Balancers combined with machine tools—check, correct and inspect parts in one set-up.

SCHENCK ELECTRO-DYNAMIC BALANCING MACHINES ARE THE RESULT OF 40 YEARS WORLD-WIDE EXPERIENCE. THEY ARE MADE IN MANY CAPACITIES TO BALANCE ROTATING PARTS WEIGHING UP TO 100 TONS.

Machine Type	R13	R23	R33	R43	R53
Measuring Range	1-22	3-66	1-220	3-660	11-2,200
(Weight of part in lbs.)					

Machine Type	R63	R73	R83	R93
Measuring Range	33-6,600	110-22,000	330-66,000	1100-220,000
(Weight of part in lbs.)				

Let Cosa Engineers recommend the proper Schenck Balancer for your needs. Or, send for detailed catalog.



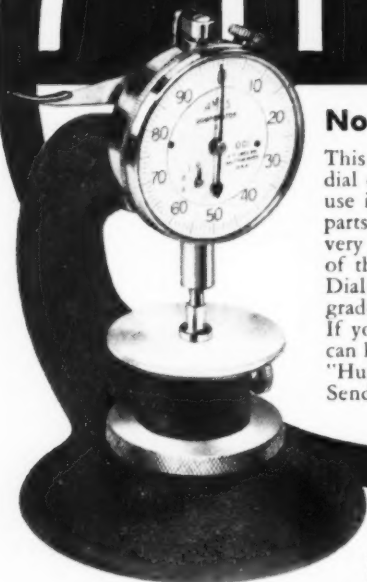
Model R33—balancing pump wheels

**COSA CORPORATION**  
405 Lexington Ave., New York 17

IN DETROIT AREA contact DETROIT-COSA CORPORATION, 16923 James Couzens Highway, Detroit 35, Mich.

Your source for all Precision Machine Tools—  
from Small Bench Lathes to Large Boring Mills

# AMES



## No. 2 Dial Comparator

This is smallest in the Ames' line of high quality dial comparators. It is ideal for desk or bench use in the fine inspection of small precision parts. Light in weight, its broad base makes it very stable. The capacity approximates that of the regularly supplied Ames No. 202 Dial Indicator which has a 0-100 dial, graduated in .001", with a .250" range. If your job requirements differ, you can have the No. 2 with any Ames "Hundred Series" Dial Indicator. Send for details.

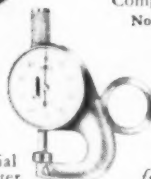
Ames Long  
Range Dial  
Indicator  
No. 2822



Ames Dial  
Comparator  
No. 130



Ames Dial  
Micrometer  
No. 516



Ames Caliper  
Gauge No. 12B



Send today for your  
free copy of Catalog No. 58



Representatives in  
principal cities.

**B. C. AMES CO.** 28 Ames Street  
Waltham 54, Mass.

Mfrs. of Micrometer Dial Gauges • Micrometer Dial Indicators

# ***WHY NOT WRITE ME*** **AND TELL ME YOUR BENDING PROBLEMS?**

PEDRICK PRODUCTION BENDERS are in use throughout the world. They save time and money bending pipes, tubes, reinforcing bars, angles and many other structural shapes. Why not increase your bending production and reduce your costs with semi-automatic bending? Ideal for job or production work.

Available in 9 power models, starting at \$1575.00.



*Write For  
Descriptive  
Folder*



## **PEDRICK TOOL AND MACHINE CO.**

3640 N. Lawrence St.

Dept. 3

Philadelphia 40, Pa., U.S.A.



Designed for... HIGHER PRODUCTION WITH GREATER  
ACCURACY AT LOWER COST PER PIECE MACHINED

# Burgmaster

No. 2 — Model A

SIX SPINDLE TURRET TYPE  
POWER INDEXING DRILLING  
AND TAPPING MACHINE

...will increase  
your production up to **30%**  
thereby reducing your  
production cost!

Used by the leading aviation,  
industrial and automotive plants  
from coast to coast.

(Names available on request)

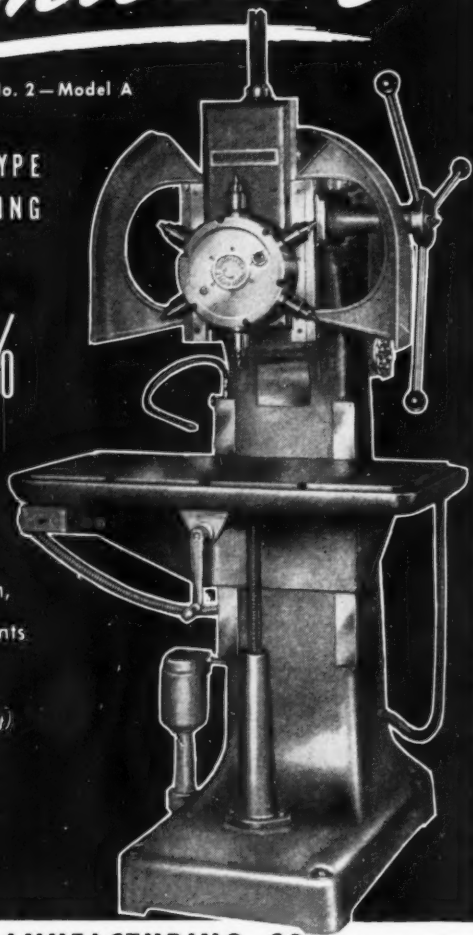
**WRITE TODAY**

For catalog and detailed  
information to:



**BURG TOOL MANUFACTURING CO. DEPT. BB-5**

**3743 DURANGO AVENUE • LOS ANGELES 34, CALIFORNIA**





**EXTRA POWER** for top performance

*In A Jet Plane*, rockets supply the extra launching power needed for fast-climbing takeoff. In industry, Jacobs Plain Bearing Chucks supply the extra gripping power vital to top performance in light- and medium-duty drilling. This, plus rugged construction and precision accuracy, makes them the world's most widely used chucks.

The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

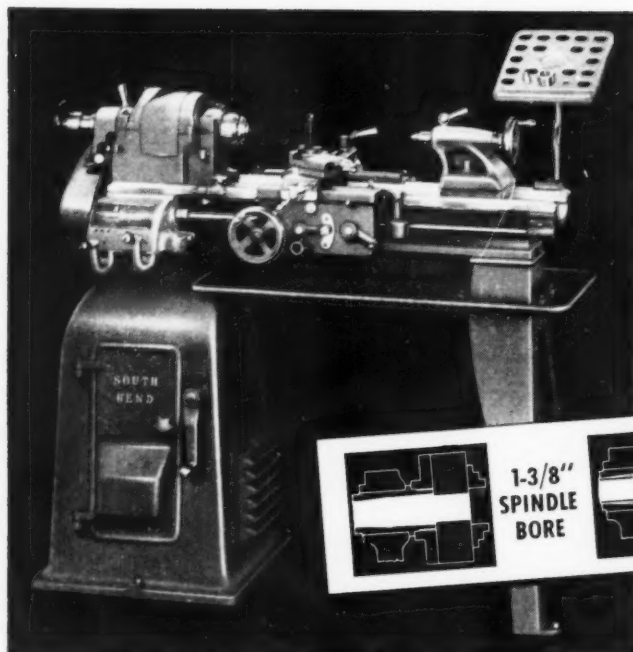
IF IT'S A **JACOBS** IT HOLDS

**Jacobs and your  
local distributor**

are ready to deliver the chucks you  
need and the service you deserve.

**... first in chucks**

**... first in service**



# SOUTH BEND 10" Lathes



1-3/8"  
SPINDLE  
BORE



1" COLLET  
CAPACITY

## 10" Precision TOOLROOM LATHE

Sound design, expert workmanship and quality materials give the 10" South Bend Lathe the dependable performance you want. Equipped with a precision lead screw, thread dial indicator and thread cutting stop, you can use it with confidence for cutting screw threads, making precision gauges or turning out instrument parts.

Another outstanding feature is the 1" collet capacity and 1-3/8" spindle bore which is built on the same design and specifications of larger lathes. The large spindle bore gives you big lathe collet capacity in a small, compact unit.

You will like the way this lathe cuts idle time...reduces costs...releases big lathes for heavy work. Write for catalog.

### SPECIFICATIONS

**SWING** 10 1/4" over bed and saddle wings, 5 1/4" over cross slide.

**COLLET CAPACITY**.....1 in.

**SPINDLE BORE**.....1 3/8 in.

**BED LENGTHS** 3, 3 1/2, 4, 4 1/2 ft.

**CENTER DISTANCES**.....14 3/4 to 34 3/4 inches.

**SPINDLE SPEEDS** (12) 50 to 1357 r.p.m., approximately.

**POWER LONGITUDINAL FEEDS** 48 R.H. or L.H. .0015" to .0836"

**POWER CROSS-FEEDS** 48 .0006" to .0309"

**THREAD CUTTING** 48 R.H. or L.H. pitches, 4 to 224 per inch.

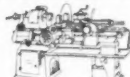
#### SEND INFORMATION CHECKED:

☐


☐ 9" and 10"  
BENCH LATHES



☐ 10" to 16-24"  
FLOOR LATHES



☐ 1/2" and 1" Collet  
TURRET LATHES



☐ 14"  
DRILL PRESSES



☐ 7"  
BENCH SHAPERS

Name \_\_\_\_\_

Company \_\_\_\_\_

Street \_\_\_\_\_

City & State \_\_\_\_\_

Building Better Tools Since 1906 • SOUTH BEND LATHE • South Bend 22, Indiana



an  
**ACCO**  
product

**Sphero-Conical**  
**DIAMOND BRALE<sup>\*</sup> PENETRATOR**  
**for Hardened Steel**

**HOW IT WORKS**

- A. Minor Load Penetration
- B. Major Load Penetration
- C. Linear measurement of penetration increase which "ROCKWELL" converts to hardness reading



***BRALE Penetrator Accuracy Is Proved  
in Wilson's Standardizing Laboratory***

● One point of hardness on the Rockwell C scale equals .00008" so penetrator accuracy must be constant. That's why Wilson maintains its Standardizing Laboratory for testing on many test blocks and approving every BRALE penetrator.

Each BRALE is precision ground to shape under high magnification and is accurate to the degree required for a research laboratory. Wilson's BRALE Penetrator gives true readings at all points on the dial. To get the greatest accuracy from your hardness tester, see that it is equipped with a diamond BRALE penetrator.

\*Trade Mark Registered

**ACCO**

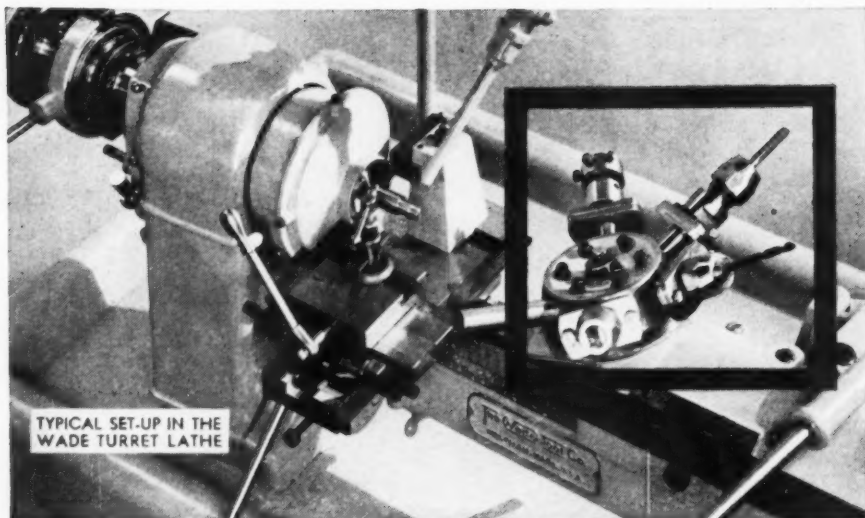


Write for literature

**WILSON MECHANICAL INSTRUMENT DIVISION  
AMERICAN CHAIN & CABLE**

230-T Park Avenue, New York 17, N. Y.

**WILSON  
"ROCKWELL"  
and TUKON  
Hardness  
Testers**

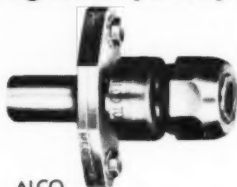


TYPICAL SET-UP IN THE  
WADE TURRET LATHE

**ALCO TOOLS** are being used in the  
better machines  
for producing the highest quality of precision work.



ALCO  
RELEASING  
BUTTON DIE HOLDER



ALCO  
RELEASING TAP HOLDER



ALCO  
DRILL CHUCK

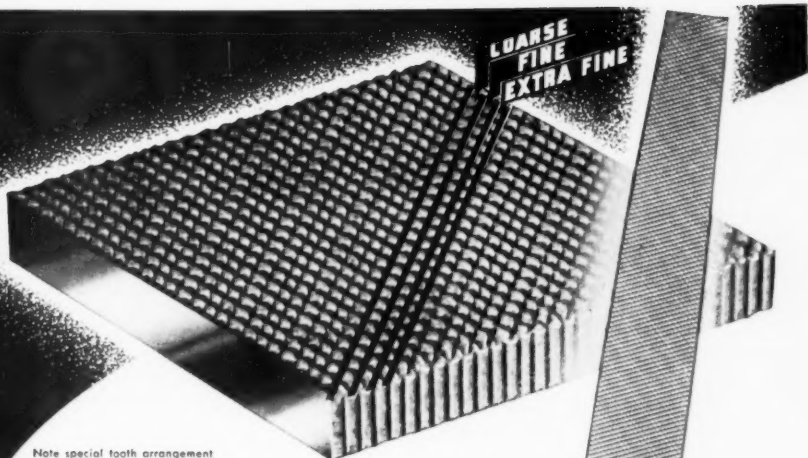
When specifications call for work to be kept to close tolerances on precision threading, Alco Chucks and Holders deliver the goods. Absolute concentricity is assured with the now famous concentric alignment feature of all Alco Tools. The drill, the tap, or the die are positioned while the flanges on the holder are open, and when the flanges are tightened simply with one wrench on the studs, these tools are concentric with the work and stay that way.

Even wear on the cutting face of taps and dies and drilling on exact centers means longer life for your threading tools and improved production with no rejects. This all helps to reduce scrap and waste and speed production. Alco equipped screw machines are better able to compete on price because of these economies. Alco Holders compensate for wear in the turret and the spindle and help to modernize old machines.

SEND FOR  
CATALOG

**ALCO TOOLS**  
EFFICIENT

**THE ALCO TOOL COMPANY**  
52 Birdseye St., Bridgeport, Conn.



Note special tooth arrangement  
in this greatly magnified section.

# here's why Heller NUCUT wavy teeth\* save half your work

★ Scientific tooth spacing provides  
double-action filing—cuts fast and deep,  
finishes smooth and scratch-free. This  
same feature eliminates chattering and makes  
possible a more durable, longer lasting file.  
Order from your local distributor.



COMPANY  
Manufacturer







## NOBLEWEST PRECISION MARKING DIES

for  
**MARKING  
 GRADUATING  
 NUMBERING  
 KNURLING  
 EMBOSSING  
 DEBOSSING**

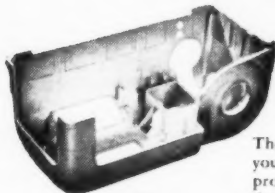
Noblewest makes dies for marking practically every type of surface, including round, flat, concave, convex and irregular contours. Noblewest dies are the finest that human skill and modern facilities can produce—yet they are *competitively priced*. Noblewest uses only specially selected steel, precision engraved to extremely close tolerances, and heat treated for extra long wear. Every Noblewest die is rigidly inspected and Rockwell tested for hardness. Large facilities permit prompt delivery. Send detailed specifications and we will gladly submit quotations. The Noble and Westbrook Mfg. Co., 9 Westbrook Street, East Hartford 8, Connecticut.







producing **BIG** ones?  
or **small** ones?  
using various types of alloys?



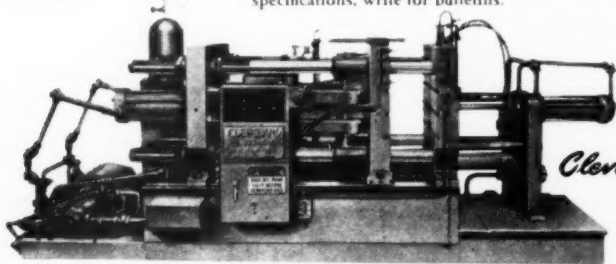
Cleveland Model 400 High Pressure Hydraulic Die Casting Machine 36" x 38" die plates; 400 tons locking pressure. Die casting machines of smaller capacities are also produced by The Cleveland Automatic Machine Company.

all your requirements for profitable  
die casting can be met with the  
Model 400 **CLEVELAND**  
Die Casting Machine

The Model 400 Cleveland Die Casting Machine will give you precision quality castings at a highly profitable rate of production. Castings may range in size from tiny parts produced in multiple cavity dies, to single castings weighing as much as 16.1 lbs. in zinc, or 7.5 lbs. in aluminum. Universal in design, the Model 400 can be quickly converted from zinc, tin or lead casting to aluminum, magnesium or brass casting, by changing the hot metal end.

Cleveland design gives you easy access to dies; ample die area; sure-fire shot mechanism; rapid, positive core pull and ejection; safe and simple control—either manual or automatic. Heavy, rigid construction and massive toggle linkage lock dies with tremendous pressure. Cleveland's high injection speed and pressure produce sound, dense, *hardware finish* castings. Dimensions are held to close tolerances; core sections are precision-cast.

The nation's leading producers of die castings rely on Cleveland dependable performance—for around-the-clock production! You should find out now how Cleveland machines can improve *your* die casting production with money saved. Call in a Cleveland engineer. For complete machine specifications, write for bulletins.



Remember

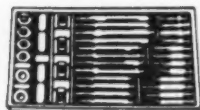
*Clevelands Cut Costs*

**THE CLEVELAND AUTOMATIC MACHINE COMPANY**

4934 Beech Street  
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO  
CLEVELAND • DETROIT  
HARTFORD • S. ORANGE

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines



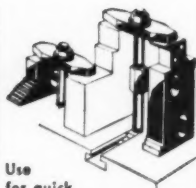
**HANDY STUD SETS**  
T-nuts to fit your machine  
16 sizes carried in stock



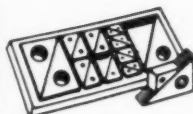
**T-NUTS**  
**COUPLING NUTS**



**STUDS**



Use for quick accurate setups like this

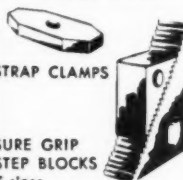
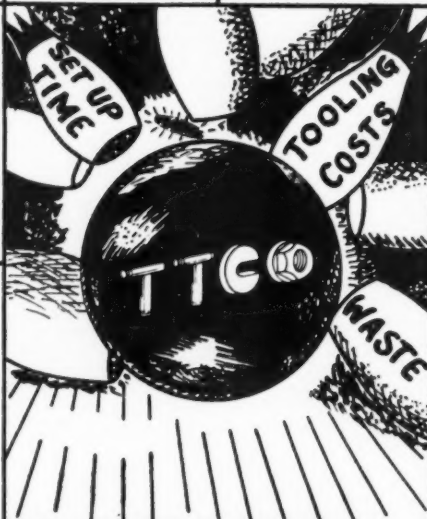


**SURE GRIP STEP BLOCKS**



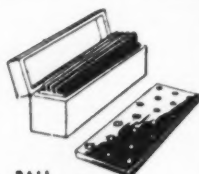
**INDICATOR HEIGHT GAGE**

**ADJUSTABLE INSPECTION BLOCK**

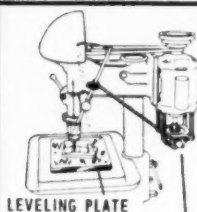


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**SURE GRIP STEP BLOCKS**  
5 sizes  
hard maple wood  
or case hardened steel  
blocks are interchangeable



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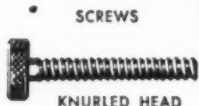


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protected from abrasive dust and grit... LONGER LIFE.

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Work sets solidly on vertical spindle... GREATER ACCURACY.

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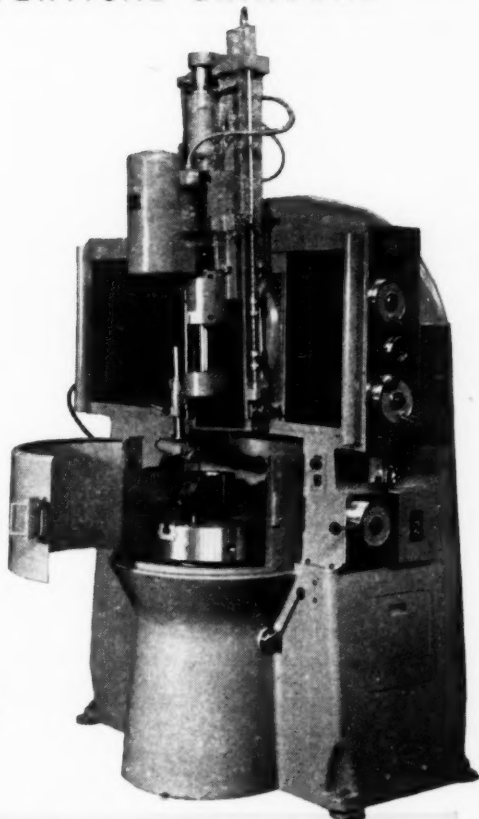
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Grind combinations of O.D., I.D., faces, tapers, shoulders or steps with one set-up. Hold extremely close related tolerances.

Springfield Vertical Grinders are thoroughly proved by 14 years of time-saving, cost-saving precision production. Various capacities to 42" swing x 24" hole depth.

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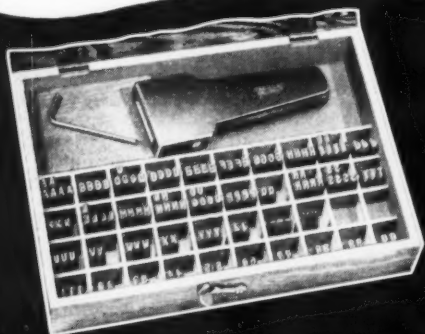
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*tr* TRANSPOSE    *C* CLOSE UP  
# INSERT SPACE    *cb* BRACKETS

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## INTERCHANGEABLE TYPE and TYPE HOLDER SETS

The faces of CADILLAC Steel Letters and Figures combine a high degree of hardness with toughness, insuring especially long life. All CADILLAC Marking Type and the recess in Type Holders are made in standardized dimensions. This means that type will fit interchangeably in hand holders, marking machine holders or punch press holders designed for the size type specified. Due to the precision adhered to in manufacturing, they will when assembled in any holder make impressions in perfect alignment.



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Does THESE  
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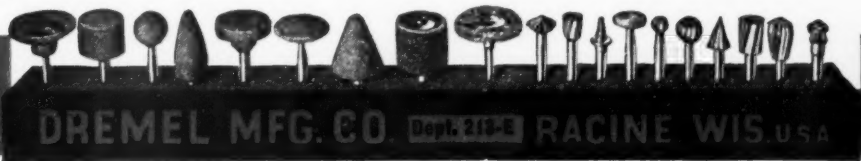
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Dremel HIGH-SPEED STEEL CUTTERS and balanced wheel points are available for all makes of hand grinding tools. Write for literature.

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Dremel Moto-Tools are time tested—have been widely used in industry for over fifteen years. A veteran of World War II, Moto-Tool served in war plants and at military maintenance bases throughout the world. Thousands of these mighty midgets helped to make the atomic bomb—were used to establish production records in defense industries during the last war. Hundreds of toolroom and production line operations, such as polishing and grinding dies, burring parts, marking tools, sharpening cutters, touch up jobs, etc. are accomplished in seconds, without tearing down "set-ups." Moto-Tool is sturdily constructed for long lasting industrial service. Weighs only 13 oz.—dynamically balanced for vibration-less operation.



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High Speed Bits?



**YOU  
NEED  
ONLY  
TWO!**



**These two high speed bits**



# These two high speed bits

Are you confused by all the grades and varieties of steel toolholder bits? Well don't be. It is true that there are many to choose from, and for some jobs special or unusual requirements indicate the need for highly specialized bits. Leave such cases up to your tool supplier.

But for 95% or more of general machining operations, where steel cutting tools are used, you need only TWO grades . . . Firth Sterling CIRCLE C and VAN-CHIP. These two will handle the widest possible range of general machining work and are recommended by Firth Sterling as all-purpose tools.

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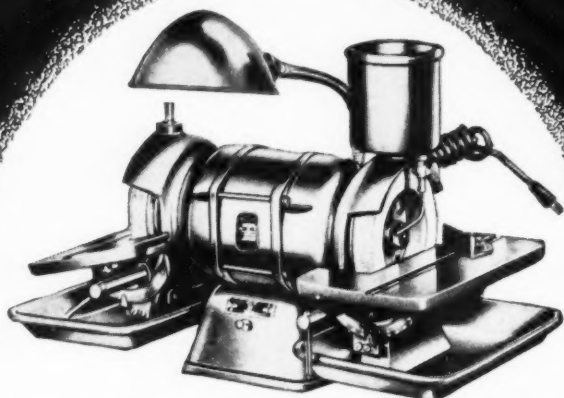
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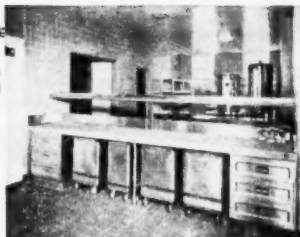
Clip this ad and mail for bulletins on Carbide Tool Grinder shown above and complete line of 6" - 12" general purpose bench and pedestal grinders.

# Baldor

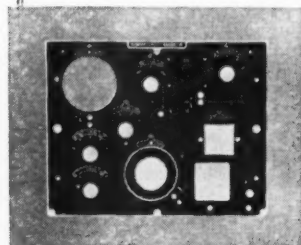
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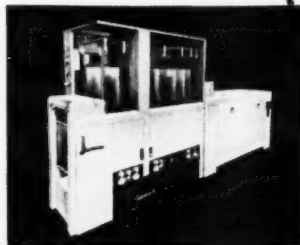
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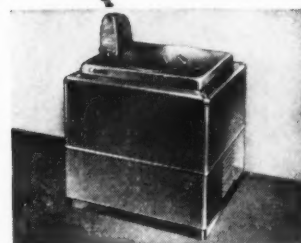
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# **RUSNOK** MILL HEADS

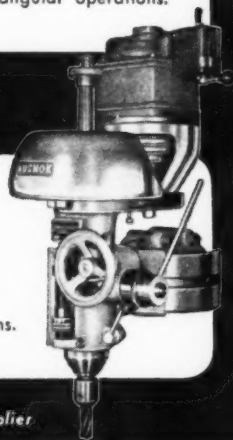
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Only low cost mill head with quill travel attachment.  
High speed medium-light operation.  
For bench, floor and pedestal mills.  
Fits milling machines with overarm 1 1/2" to 3".  
3/8" end mill capacity.



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HEAVY DUTY MILLING ATTACHMENT  
Fits milling machines with 3" to 5" overarm.  
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For vertical, horizontal and angular operations.



## **1 H. P. MILL HEAD**

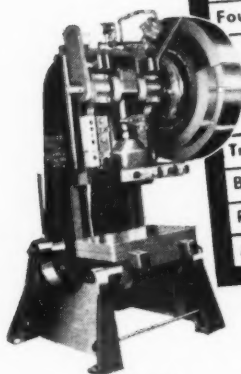
HEAVY DUTY MILLING ATTACHMENT  
Fits milling machines with 3" to 5" overarm.  
3/4" end mill capacity.  
For vertical, horizontal and angular operations.

*WRITE for complete details and give name of your supplier.*

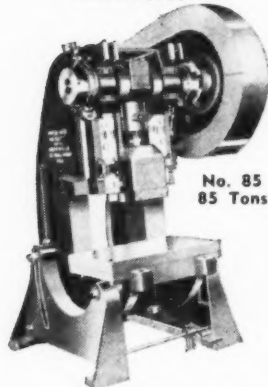


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**MILLING • DRILLING • BORING**

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**No. 60**  
60 Tons—Air  
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85 Tons

## STANDARD PRESS FEATURES (at no extra cost)

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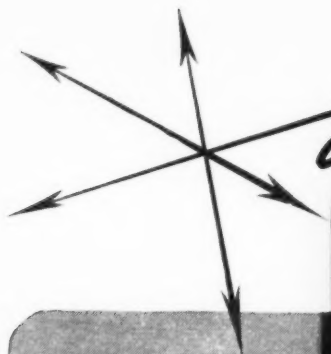
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#### PRODUCTION MODEL

Precision turning, boring and re-coring jobs that are normally assigned to toolmaker's lathes or expensive boring machines, come natural to the versatile NICHOLS Millers.

Rapid Lever Actions on the Spindle Head, Table, and Saddle provide unparalleled flexibility of movements. The Lever Transverse Feed, an exclusive NICHOLS development, is especially valuable. Makes NICHOLS different from other hand millers. It adds "lathe-carriage flexibility" to your most intricate machining operations, while maintaining tolerances to "tenths." Work can be chucked lathe-fashion on the spindle with tools mounted on the table or vice versa.

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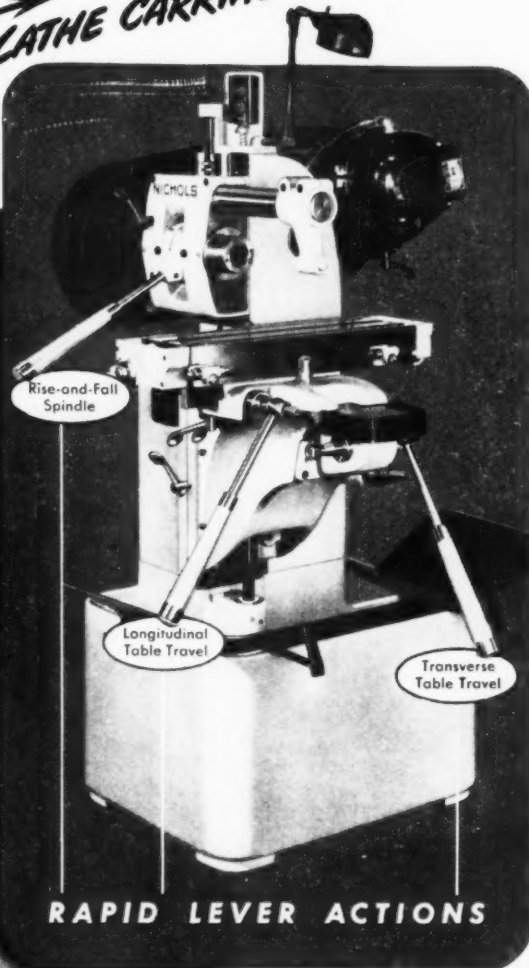
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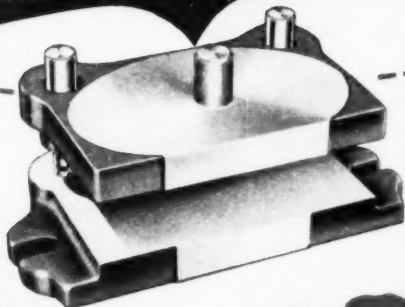


### RAPID LEVER ACTIONS

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Longitudinal Table Travel	10"
Transverse Table Travel	7"
Vertical Travel of Knee	13"
Rise and Fall of Spindle	4 1/8"
Selective Speed Ranges up to	5000 R.P.M.
Weight	1250 lbs.

# DETROIT DIE SET SERVICE COVERS INDUSTRIAL AMERICA



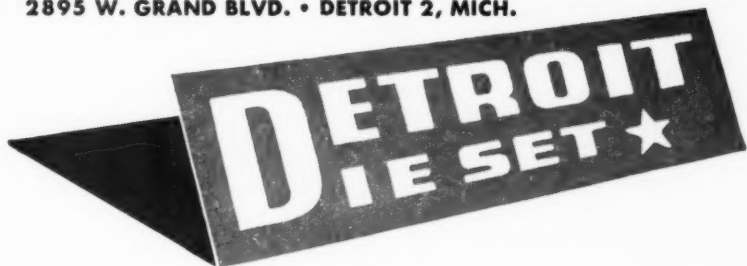
## YOUR "DETROIT" DIE SET MAN CAN HELP YOU

Your "Detroit" Die Set man knows die sets. Call him in . . . talk over your die set problems with him. Get from him full facts about the accuracy of "Detroit" parallel surfaces, the trueness of pins, the fine finish, the thorough inspection at the factory. You'll see that "Detroit" leaves nothing undone to assure easier mounting and longer production runs. Call your "Detroit" man.

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*Remember —*

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# Announcing the "MC-UNIVERSAL"

## *the Entirely New 12-inch ACME-GRIDLEY* SINGLE-SPINDLE AUTOMATIC CHUCKING MACHINE



**WORK CYCLE AUTOMATICALLY CONTROLLED**—no time loss between loading and unloading work piece.



**SIX PREDETERMINED SELECTIVE SPINDLE SPEEDS**, with each combination of change gears, insure correct surface speed for each operation. Wide range of spindle speeds—25 to 1478 RPM.

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**Turret indexing independent** of cross slide operation—located in rugged outer turret support and driven by independent motor.

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THE NATIONAL ACME CO.  
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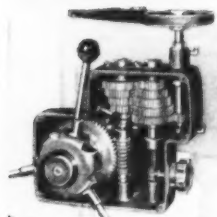
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★ Drills 1" cast iron,  $\frac{1}{2}$ " steel ★ No. 3 Morse Taper, 6 $\frac{1}{2}$ " spindle travel ★ **HEAVY-DUTY GEAR-DRIVEN POWER FEED TO TAKE FULL ADVANTAGE OF THIS BIG TOOL AND JOB CAPACITY.**

An 18" *heavy-duty* drill press, with larger tool and job capacity, PLUS a *heavy-duty* GEAR-DRIVEN power feed to make effective use of its capacity — those are the brief facts about this fine new Clausing development.

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## Maintenance report from user of 13 Rotor Grinders:

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If you haven't seen these new Rotor Vertical Grinders in action, ask for a demonstration today!

**AIR O'TOOL**

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	B-35	B-12
Weight	10¾ lbs.	10 lbs.
Wheel Size	6" Cup	6" Cup
Pad Size	7" or 9"	7" or 9"
Speeds	6000, 5000, 4500, 3500	6000, 5000, 4500, 3500
Height	7½"	7"

For cup wheels, sanding pads, cut off wheels, wire brushing.

**WRITE TODAY FOR BULLETIN No. 40**

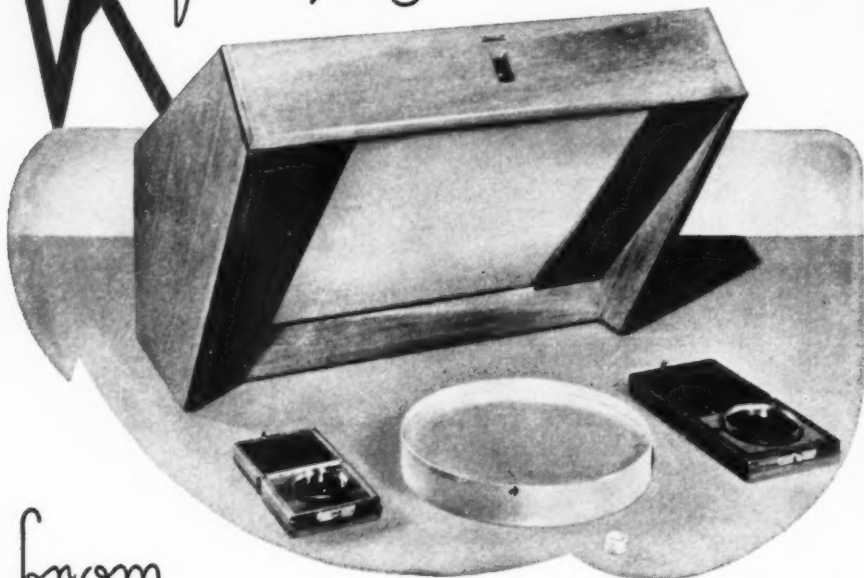
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**CLEVELAND, OHIO**

**HIGH  
CYCLE**

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from  
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VK Optical Flats are available in sizes from  $\frac{1}{2}$ " diameter to 10" diameter in .000001", .000002", or .000004" accuracy. They can be shipped within 30 days from order.

Catalog and Handbook No. 35 is available by writing: The Van Keuren Co., 177 Waltham St., Watertown, Mass. Ask for your copy.



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**S**UPPOSE you could run your screw machine continuously — get a full 8-hour-day production — with no time lost for loading, replacing feed fingers, cutting air or idle operation. How much would your production go up? 10%? 20%?

Revise your estimate — you're way low. By converting lost time into productive time in hundreds of plants, *LiPe Automatic Loading Bar Feeds* have increased output 60% to 100%. One user reports a production increase of 221%!

**OUR UNCONDITIONAL GUARANTEE.** *LiPe* AML Bar Feed will enable your screw machine to produce at least 90% of its gross geared capacity.

### WHAT A LIPE AML BAR FEED WILL DO FOR YOU:

*Feed tubes or bars automatically, continuously.*

*Abolish feed fingers—eliminate time lost in making feed finger adjustments.*

*Feed stock up to 16" long in one feed-out operation—save the time lost with multiple feed finger feed-outs, thus cutting cycle time.*

*Reduced cycle time increases gross geared production capacity of screw machine.*

- Interested? Send for folder describing AML Bar Feed—operation, benefits, case histories.



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Manufacturers of Automotive Clutches and Machine Tools  
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#### THE NEW WAY

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The point is simply this: you can expect better service—at lower cost—from your Buckeye tools.

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CARBIDE TIPPED  
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Our specialty is circular metal cutting tools to increase or maintain efficiency in automatic production machines. We know our business when we set up shop thirty years ago — and we've been refining our skills ever since.

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SAWS • COMBINED DRILLS,  
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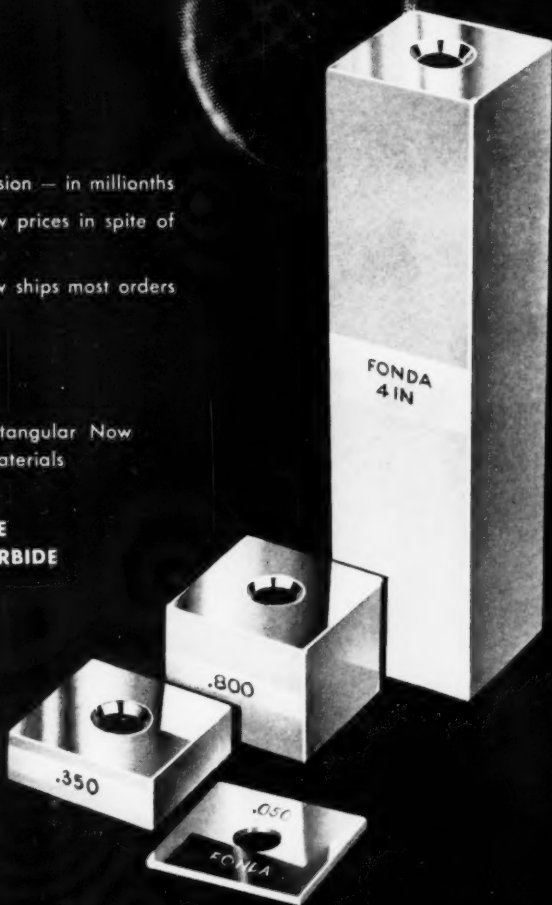
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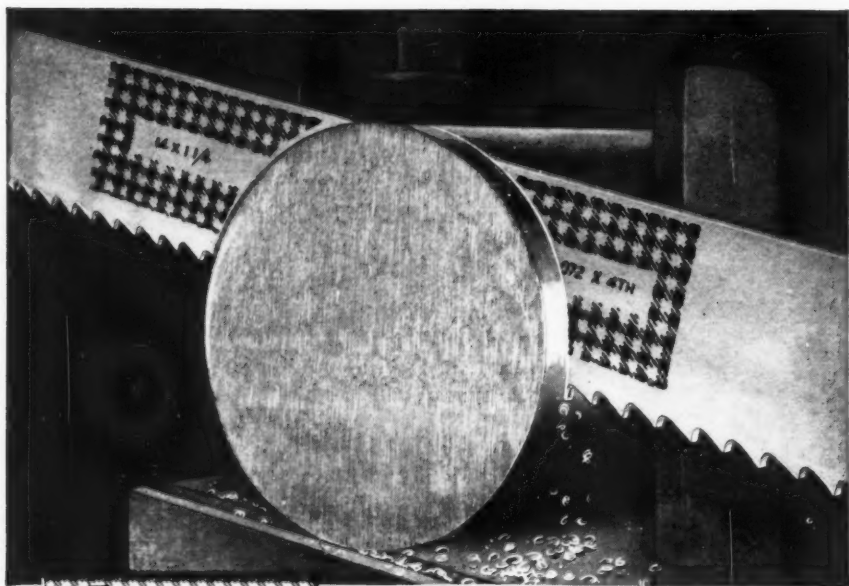
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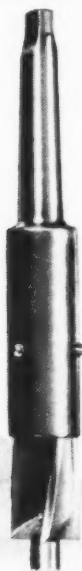


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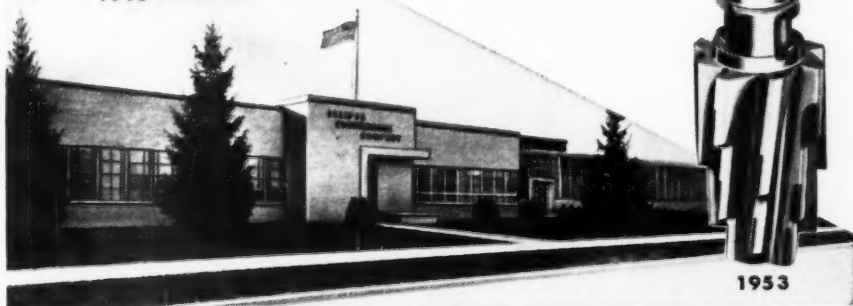
Management and employees take pride in announcing to our many friends and customers that Eclipse Counterbore Company became 40 years of age in May. From a humble beginning in 1913 to a position of leadership in 1953, Eclipse is today truly synonymous with quality in the cutting tool industry. This healthy maturity could never have been attained without the help of those same friends and customers . . . and so to them we say "Sincere Thanks."

◀ The original Eclipse interchangeable single-diameter counterbore created in 1913.

A modern multi-diameter carbide tipped Eclipse Cutter. ▶



1953



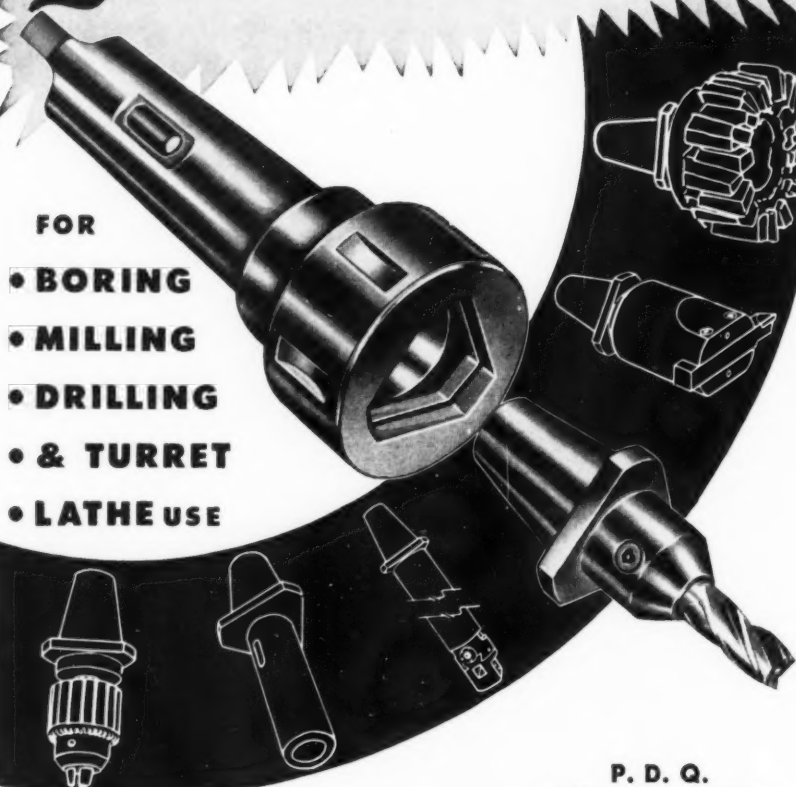
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# Featured IN THIS ISSUE

<b>Machining Operations on the New 280-Millimeter Artillery Piece</b> .....	<b>157</b>
<b>Case Histories Calculate the "Dollar Wisdom" of Using Portable Air Tools</b> .....	<b>200</b>
<b>The Right Rivet for the Right Job Can Save You Time and Money</b> .....	<b>218</b>

**Machining Operations on the New 280-Millimeter Artillery Piece**, by D. A. Booth. Production of complex carriage assemblies for the Army's 280-millimeter gun, capable of firing an atomic shell, necessitated considerable ingenuity in adapting existing machine tools to perform unique operations. How this was met at Dravo Corp., Pittsburgh, one of the three prime contractors to the Ordnance Department, is shown in the article. Page .....157

**Unusual Machining Problems Solved by Borg-Warner's Detroit Gear Division**, by Harry H. Whittingham. Probably the most complicated and intricate pieces of mechanisms in today's automobiles are the automatic transmissions. The functions of the various parts are more easily understood after reading of the unusual problems the Detroit Gear Division of Borg-Warner Corp. had to overcome. Page .....164

**The Practical Joker Isn't So Practical**, by Edmund Mottershead. One of the hardest problems the foreman has to overcome is the typical practical joker who doesn't know when to quit; how he can be handled without hurting his pride and yet "save his face" is explained in this month's Foremanship Forum. Page .....178

**Universal Pitch Circle Drilling Jig**, by Tom Brown. Very often small firms engaged in batch production of components are confronted with the problem of deciding whether jigging and tooling will prove economical for their work. Sometimes a tool can be modified to cater to a wide range of similar work. The jig forming the subject of this article arose out of the need for means of drilling equally spaced holes

around pitch circles in disc-shaped components. Page .....190

**Case Histories Calculate the "Dollar Wisdom" of Using Portable Air Tools**. In this study, examinations through the plant and the actual testing of "opportunity areas" define the benefits to be gained from either replacing hand tools with portable ones or changing one portable tool for another. The next step is to translate the data gathered into dollars and cents values to prove that a changeover is justified economically. Page .....200

**The Right Rivet for the Right Job Can Save You Time and Money**, by Robert M. Gordon. This is the second of two parts on the selection, types and uses of rivets. Herein Mr. Gordon deals with specific applications, analyzing them from several standpoints, also touching on materials and various units needed for the operations. Page .....218

**BLUE BOOK'S "Know-How" REFERENCE SHEETS**. A timely and handy reference for many shops to cut out and put in their loose leafs, this deals with the chemical composition of steels. Page .....235

**Special Report on Grinding Machines**. This report, No. 29, is part 3; it deals with formed cutters and special grinders plus several phases of diamond wheel grinding such as wheel shapes, overheating, dry and wet grinding, diamond supply and new grinding methods. As previously, there are also descriptions of late model tool and cutter grinders and specifications of machines built in the United States. Page .....243



Photos courtesy—  
The Cleveland Pneumatic  
Tool Company, Cleve-  
land, Ohio.

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gives *complete* satisfaction...

The convenient centralized controls, the wide range of speeds and feeds, and the high visibility head of this Cincinnati Bickford Radial Drill are all contributing to fine performance on this job.

The Cleveland Pneumatic Tool Company say "Performance and ease of handling are all that could be desired."

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Write for Bulletin R-29.



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## Not Wanted: Gloom Merchants

There is little of pleasant news in newspapers. Most of it is bad: fires, murders, accidents, floods, famines, etc. True, it is news; it is also dramatic, and drama sells newspapers. Drama also sells commentators, news services, business forecasts, columnists. Drama is the stock-in-trade of the crystal-ball gazers, the amateur economists and the armchair businessmen. And so we find the economic fortunetellers constantly injecting their dramatic notes . . . "Business looks good for the next six to nine months; however, weak spots are appearing." . . . "While experts are holding up, some foreign countries are experiencing mild recessions." . . . "Business looks good, but prepare for a downturn."

We've had this dramatic pomposity dinned into us ever since the war, most of the time by men whose claim to fame is a facile pen and a sluggish business sense. But they've had their effect on businessmen and the public. There is a growing conviction that we're in for a bust . . . "and it's gonna' be a wow!" The positive thinkers, who look to the future with optimism and courage, are in the minority; their voices are lost in the cacaphony of the death march drummers.

There is too much at stake for crape hanging at this time, and too much evidence that a "bust" is not in the offing. Business **must** take a positive attitude.

We have a change of political climate in Washington, warm to business. For twenty long years the dominant political theme has been, "Government can do

it better than business. Business must be controlled." Now, business has been readmitted into American life as an equal, and is represented in the council chamber. Let's not go to a meeting dressed in black like a well-dressed third-class mortician. This is not the time for snooping in dark corners for ghosts; it's not the time to go whistling like a boy passing a graveyard at dead of night.

We must be positive in our thinking! To be sure, we musn't hide our heads in a pile of chips and ignore the world, but our aim must be to maintain the prosperity. And this means positive thinking, combined with positive action.

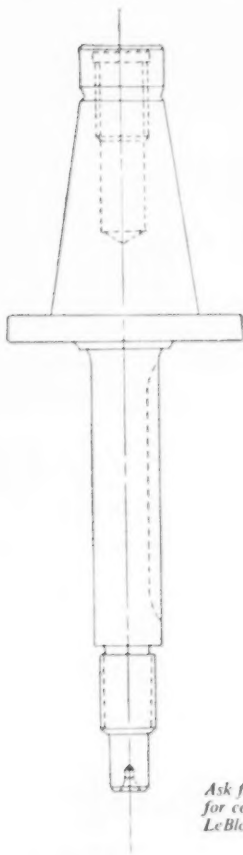
We must analyze our cost structure, our manufacturing, sales and advertising procedures to the end of achieving highest output at lowest cost. Every effort must be made to make the best products available to more people at lower cost. There are thousands of people so conditioned by the last twenty years, they are waiting to point the finger of scorn and scream, "We told you so. Once again we'll have to take over and set the house to rights." Should that happen, wave the free-choice system in this country good-bye.

Business cannot afford the luxury of black thoughts, it cannot afford anything but positivism and optimism and continual forward-striving.

Leave the black trappings to the amateur crystal ball gazers. If the past ten years haven't given them a hopeful outlook, they are beyond all redemption and should be buried in their own crepe-paper.

*William F. Schleicher*

# same time, same lathe... plus "Hydra-trace"



When defense needs mushroomed demand for production equipment, Scully-Jones & Co. of Chicago found itself jammed with orders for milling machine arbors (they make more arbors than anyone else). Acting on advice from engineers at LeBlond's Chicago Office, Scully-Jones added Hydra-Trace to their LeBlond 16" RT Engine Lathe. Now they turn out four arbors in the time formerly needed to produce three—same lathe, plus Hydra-Trace.

Besides boosting output, this template-controlled hydraulic tracer saves 45% on set-up time, gives uniform precision without the need of a highly-skilled operator.

Stepless form-turning, contour facing, and turning step shafts are all in a day's work for Hydra-Trace. Fits all LeBlond Engine Lathes built since 1935, can be mounted easily in a matter of minutes. Templates are flat, compact, suitable for both rough and finish turning. They can be produced readily in your own plant, stored in limited space.

When turning requirements call for increased output—with present machines or with new equipment—you'll find just what you need in LeBlond's complete line of lathes and lathe attachments.

*Call your nearby LeBlond Distributor or write—*

*Ask for Bulletin HT-2E  
for complete details on  
LeBlond Hydra-Trace.*

*turned faster by*

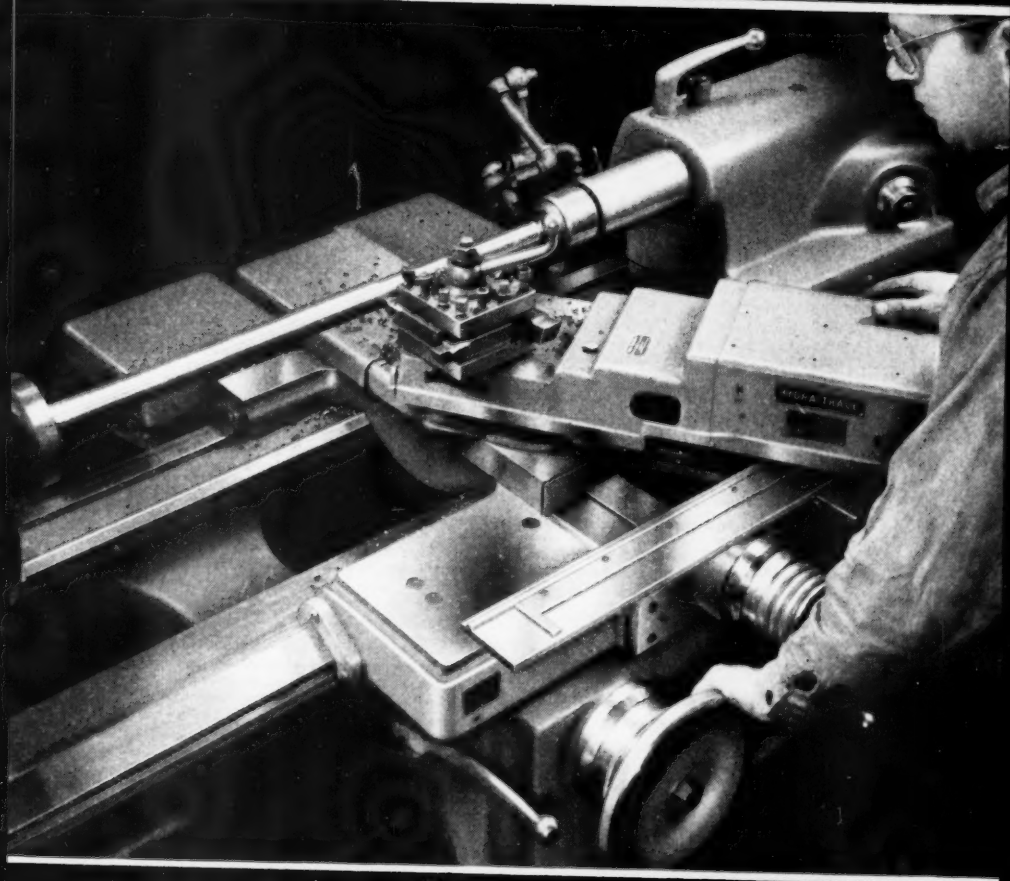
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WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 65 YEARS

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# four arbors instead of 3...



Hydra-Trac (Trade Mark, Registered U.S. Pat. Off.) is LeBlond's heavy duty hydraulic tracing attachment. It can be mounted in place of the compound rest on practically all LeBlond Lathes built since 1935.



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The reputation and performance of Ross In-line Series Valves are so outstanding that imitations are constantly being attempted. Through constant improvements, the Ross In-line Series remains the leader and the envy of the trade. Here's why—

- ✧ Dependable—10 to 20 million maintenance-free cycles, and many more tens of millions of life-cycles, are not uncommon.
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- ✧ Positive seal—poppet construction; Hycar seats.
- ✧ Easy maintenance—only a few moving parts; can be disassembled without breaking line connections — solenoids readily accessible.
- ✧ Many modifications—vacuum, air, and liquid service; various pressures; available for AC or DC solenoids or air actuation with or without sequence timing; interchangeable heads.



*Write for full information on the Ross In-line Series*

**Ross** OPERATING VALVE COMPANY

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## LAST MINUTE WASHINGTON NEWS



by Arnold Kruckman

Washington Correspondent



This is what the Eisenhower Administration thinks about itself. The words were spoken by Postmaster General Arthur E. Summerfield.

"This is the hardest working Administration that has been in power in years. The men, and potentially the women, are a serious industrious group whose motto is 'labor for the common weal'—and 'labor' they do.

"I think the best way to show you the new picture is to tell you just what

was done in one single week. First, on the second of the month, Director of the Budget Dodge announced his 'freeze on Government employment.'

"Second, two days later there was announced the combination of Defense Production Administration with the Office of Defense Mobilization.

"Third, while these steps in governmental administration were being taken, two high officials of the new Administration, secretary of state and the director of mutual security, were moving fast from capital to capital in western Europe.

"Fourth, on the sixth of the month came decontrol affecting wages, salaries and prices.

"Fifth, on the same day the president set up the European flood disaster committee to expedite aid to peoples in western Europe stricken by the worst floods in centuries.

"Sixth, the following day an additional undersecretary of state was named for the first time to take charge of reorganization and administration of the Department of State.

"Seventh, on the same day it was announced in Tokyo that two additional ROK divisions had been authorized.

"Finally, two days later Sen. Taft and Sen. Bridges announced an eleven point legislative program. That program, not complete, but touching highlights of the Republican program for this session of Congress, ranged from Hawaii statehood and Taft-Hartley Act amendment, to extension of the Reciprocal Trade Act and simplification of customs regulations to aid and encourage foreign trade.

"Every department of the government is under orders to trim its operations and to clean house, to cut down hirings, to abolish duplicating functions, to unsnarl tangled lines of





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5. **SHOCK ABSORBER** to
  - a. Absorb line shocks.
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## *If you* **Design or Operate HYDRAULIC SYSTEMS**

## *An Invitation*

The list of applications of Greer Accumulators reads like a directory of outstanding engineering developments of the past decade.

The wealth of experience gained in helping others to reduce the size, cost, and complexity of hydraulic equipment with Greer Accumulators is now available to you without obligation. Consultation during your earliest design stage will save you considerable time and expense.

Whether you are building or designing new equipment or wish to improve the operation and efficiency of existing hydraulic systems, it will pay you to consult us.



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authority, to cut costs. In one department, the huge organization that makes up the nation's defense establishment, the secretary of defense has directed a reduction of more than 35,000 civilian jobs before the end of this fiscal year.

"The weekly luncheons of the president, to which are invited members of Congress from both parties, have given legislators who have been in Washington for years the first chance they have ever had to enter the White House, to talk informally with the president of the United States. The Administration has defined its policy: budget cuts come before tax cuts; we shall have both budget and tax cuts but in the proper and sound order.

"Foreign policy; in Europe, the president has forcefully impressed upon our allies the urgent need of west European unity . . ."

The foregoing is a true picture, in brief, of what the Eisenhower Administration thinks of itself. The statement has the approval of the president. It is not, however, what all Republican members of the Congress think of what has thus far happened. For instance, the translation of the Federal Security Agency to the status of the Department of Health, Education and Welfare, off-the-record, has caused much perturbation and questioning. The Social Security Agency has always been regarded, both by Republicans and Democrats, as the most important implement of the federalization, or collectivist trends in all phases of our national life. In its new incarnation the FSA expands its personnel of 37,000 and is expected quickly to move to extend the casualty and disability self-employment tax to ten millions more citizens, including farmers, physicians, engineers, clergymen, teachers, lawyers, undertakers and all other professional and semiprofessional people who have not yet been covered by this taxation.

There also is much apprehension in Washington over the Administration's program to demand tighter and more comprehensive laws for the control of the educational processes of the nation. You hear it said in the highest levels on the Hill that the Republicans are following the collectivist trend of the New Deal purely as a matter of practical politics in order to be certain to dominate the next Congressional election.

While superficially the picture is political, it is essentially of deadly serious importance to every business man. At the moment this is being written there is going on a struggle between some of the Executive agencies and some of the committees of the Congress to determine whether the federal government shall continue to operate industries in competition with private industries as it has since 1917. Rep. Ralph W. Gwinn (R., N.Y.) has introduced HJR-123 proposing an amendment to the Constitution of the United States to prohibit the U.S. government from engaging in business in competition with its citizens.

Commander Harold B. Say, who represents the Portland, Ore., Chamber of Commerce in Washington, and is a seasoned and sober observer, says: "Whether the budget reaches balance and taxes undergo reduction depends in a large way on how much courage Administration people and members of the Congress have and will risk. Is a dairy state member of Congress going to lead or go with any elements to cut the support price and production of

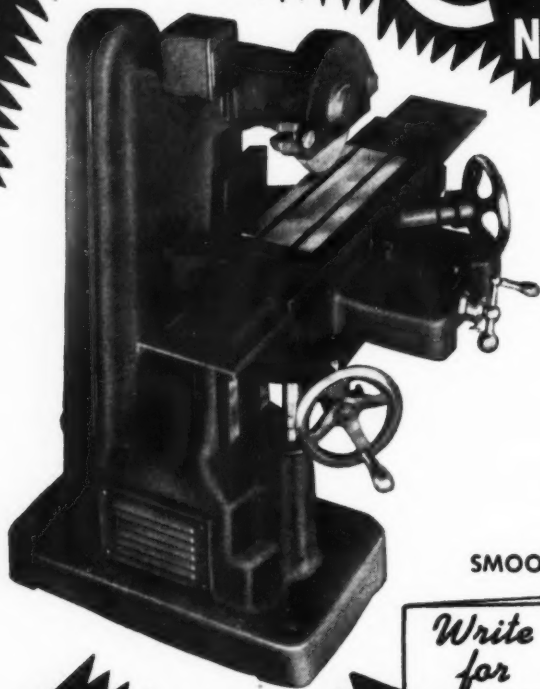
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MT-53

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Grinders for 78 Years

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GRINDERS  
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DRILL GRINDERS — UNIVERSAL CUTTER & TOOL GRINDERS —  
HYDRAULIC & HAND FEED SURFACE GRINDERS

**PROMPT  
DELIVERIES  
FOR DEFENSE**

butter—now far beyond consumption? In the face of ammunition shortages and the like in a war, how many members of Congress will wade in for a slash in the military budget even though they know full return is not forthcoming for all the dollars appropriated? They are waiting for facts and simultaneously for the lead of those willing to risk votes in bold moves."

Those who are working to slash the budget increasingly realize the job is more than difficult. There is considerable optimism, both at the White House and on the Hill. But when you talk off the record with individuals in the departments reported to be cutting costs, you learn that the technique is to apparently yield to a cut; and then, when the item-by-item checkup occurs in Congress it can easily be demonstrated that the cuts would be destructive to the proper functioning of government. It is a well established technique, devised and worked upon Congress after Congress, by those who make the permanent machine of government tick. And it is this personnel whom the new incumbents find so difficult to bend to their objectives. This technique ties in with the technique that submits to the reduction of personnel in agencies, and then proceeds to build up new agencies to absorb those who have been separated from their jobs.

The Department of Agriculture promises it will cut its budget at least 10%. Its budget is \$2,030,979,434. Commerce Department has a budget of \$1,031,272,777. It has said publicly it will reduce its needs by 15%. But privately you learn most of the proposed cuts would come out of the appropriations for the Maritime Administration, and the Civil Aeronautics Administration. The reductions are to be accomplished by withholding funds from airports, and by stopping maritime construction projects scheduled to be finished next year.

Another impediment in the tax reduction program is Eisenhower's insistence that there must be a drastic overhaul of the tax system, as well as a balancing of the budget, before tax reductions are made. Members of Congress are never allowed to forget the voters want tax reduction immediately; those who earnestly wish to reduce taxes as of now express their surprise that in this barrage of communications there are so few from business people.

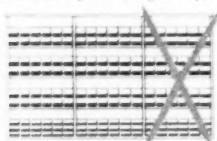
There is still another equation in the tax problem that gives concern to those who want to reduce taxes. They believe billions can be cut out of the defense department budget but they can't calculate what may come out of the needs that we may have assumed in connection with Indochina.

Budget Director Dodge, as well as Undersecretary of the Treasury Folsom, has been outspoken in his championship of the need for devising better methods of applying depreciation in those business operations in which Government has any relation with businessmen. Chairman Reed of the House Ways and Means Committee repeatedly has told his staff that they should come up with some flexible rule for determining depreciation allowances. The Department of Defense recently announced: "Contractors will be afforded a reasonable allowance for realistic depreciation under defense contracts." Details of the directive in which the Defense Department sets forth its ideas can be had by writing to the Office of Public Information, Department of Defense, Washington 25, D. C., and asking for Directive No. 4105.34.

## NEWS ABOUT CREATED-METALS

### Are Industry Inventories too High?

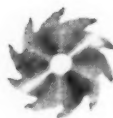
*Business Week* recently stated, "Don't underestimate the inventory problem. If a recession starts anytime in 1953, stocks of goods are likely to be at the bottom of it." *Iron Age* pointed out that, "hottest subject in automotive circles today is reducing tooling costs and shortening the tooling time cycle."



informed sources in the field say that the Carboly Minimum Tool Inventory Plan (described on these pages) is a forward step in answer to these problems as far as cutting tools are concerned.

### Woodcutting Saws to Get New Teeth

The Carboly organization has recently standardized production on 20 solid tungsten carbide tips for circular woodcutting saws. Saws with these carbide tips will soon be available from a number of saw manufacturers and offer phenomenal production increases over steel blades. Tool manufacturers can obtain details and prices by writing for Bulletin W.W.-53-1, Carboly Department of General Electric Company (address at right).



### Communications Given Boost by Magnets



Because they help eliminate costly, bulky coils, Carboly permanent magnets are being used more and more in communications equipment. The list includes loudspeakers for shops, radio, TV, other electrical components in telephones, transmitters, phonographs, hearing aids, etc.

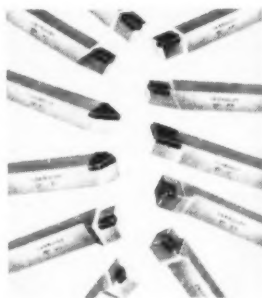
These are the same Carboly permanent magnets shop men find so useful for separating sheet steel, retreating tools, holding jigs and doing other handy, timesaving jobs.

YOUR CARBOLOY SALES REPRESENTATIVE SAYS...

## "Let us show you how up to 1/3



"OUR Minimum Tool Inventory Plan is the answer. It's an easy-to-adopt plan that works! Under it, you stock a basic number of low-cost Standard Carboly Tools in place of many costly 'specials.' The proposal shows you how to adapt these Standards to almost any single-point tooling job... simply and quickly. You use your regular carbide equipment. You'll cut down production delays. You'll reduce your inventories 30% or more. Read about it on these pages..."



### What are Standard Carboly Tools?

They are high-quality carbide-tipped single-point tools for turning, boring, facing and other machining operations. They outlast high-speed steel tools as much as 10 to 1... will operate at machine speeds up to 4 or 5 times faster than ordinary tools.

There are only 11 styles of Carboly Standards. They can be used "as is," or ground in minutes - to do up to 80% of your single-point tool machining jobs. Carboly Standards are as near as your phone, too. They are stocked in your area by Authorized Carboly Distributors.

### 2 Here's how they adapt to your jobs.

At left is a style C Standard Carboly Tool - one of the 11 styles. Note the generous-sized carbide tip. It can be used "as is" for some jobs... or adapted to meet any number of your special tooling requirements (as the 5 typical adapted shapes at left, for example).

Carboly Standards can be ground quickly in your own tool room, using an ordinary silicon carbide wheel for the rough grind, a diamond wheel only for sharpening. With a minimum stock of Standards on your shelves, you'll be able to get up to 80% of your single-point machining jobs rolling in a hurry.



# to reduce your single-point tool stocks ... with Standard Carboloy Tools!"



## 3 Here's why the Minimum Tool Inventory Plan (MTIP) will work for you.

The Carboloy MTIP includes all the helps you'll need to standardize your single-point machining jobs with Carboloy Standard Tools. Send for the free MTIP kit. When it arrives:

(1) Review your special single-point blueprints, using the handy plastic

Instant Tool Selectors (above) to choose in seconds the right Carboloy Standard Tool to adapt for each job. (2) Enter the findings on the Plan Sheet (above, center), filling in the "... Tools Recommended" section. *That's all there is to it!*

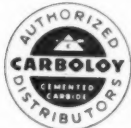
Now you can quickly compute what Standards you'll need, how many to stock, how much they'll cost. You'll see at a glance how the MTIP reduces your inventories up to one-third or more... lowers initial tool investment, shortens delivery cycles... gives you other benefits shopwide.

## 4 A Carboloy Sales Representative or Distributor will make sure it works.

Before you adopt this plan you can, if you wish, have a carbide expert from the Carboloy factory, district office or nearby Carboloy distributor come to your plant... help you get the MTIP rolling. He knows what carbide grades to recommend for particular jobs. He'll show you how Standard Carboloy Tools can pay for themselves in increased production and downtime savings alone. His services cost you nothing.



Carboloy Tools Are Stocked  
Coast To Coast By



Look under "Tools" in the Yellow Pages of your local telephone book, or in Thomas' Register, for your nearby Carboloy distributor. He has complete local stocks and can give you complete carbide service.

\* Carboloy is the registered trademark of the Carboloy Department of General Electric Company.

GET ALL THE FACTS. MAIL COUPON TODAY!

## CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11129 E. 8 Mile Blvd., Detroit 32, Michigan

- ☐ Please rush me, at no cost or obligation, full details on your Minimum Tool Inventory Plan.  
☐ Have your representative call, without obligation.

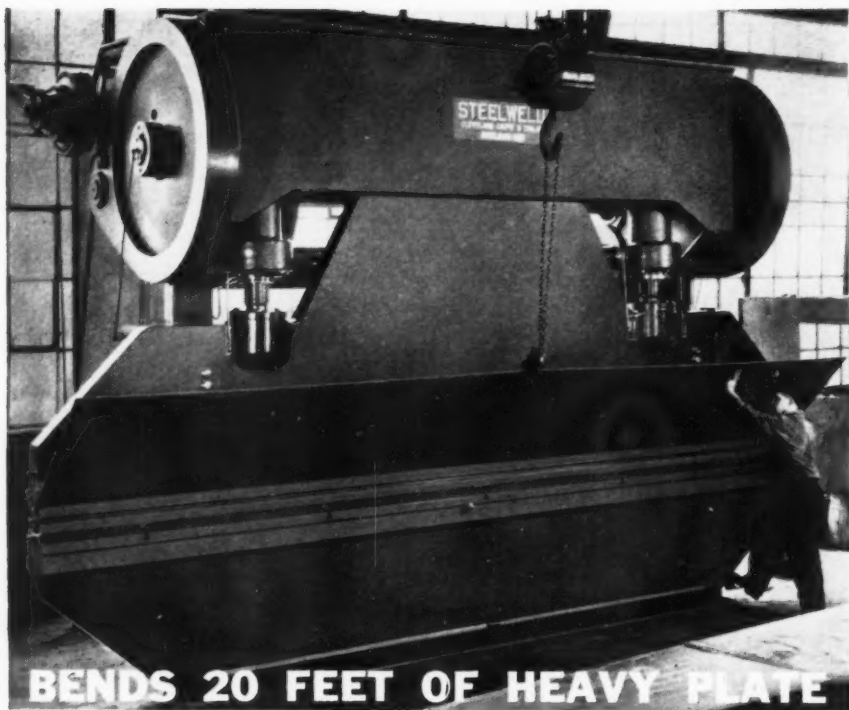
Name \_\_\_\_\_ Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_





## BENDS 20 FEET OF HEAVY PLATE

Model L 5-1/2—12 Steelweld Press bending 5/16" steel plate 20'-0" long

How long does it take you to weld or rivet two 5/16" x 20'-0" steel plates together at right angles? How long if you were making a U-shaped or Z-shaped item?

For work of this sort you will find a Steelweld Press a most useful tool. It will cut time and cost to a small fraction. You will save even when you only have occasional odd jobs. For production runs the reduction in time is tremendous. And you will save rivets and angles or welding rod and power too.

Bending is just one of the various types of work you can do on a Steelweld Press.



### GET THIS BOOK!

CATALOG No. 1010 gives construction and engineering details. Profusely illustrated.

### THE CLEVELAND CRANE & ENGINEERING CO.

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## STEELWELD BENDING PRESSES

BENDING • FORMING • BLANKING • DRAWING • CORRUGATING • PUNCHING



# How's BUSINESS?

## Defense Spending to Continue

With the chance of a possible truce has come talk of a possible slow down in defense spending. Some observers feel there will be a long "stretch out" and that future defense orders will depend on a "let's wait and see" attitude. Defense Department spokesmen say 'tain't so.

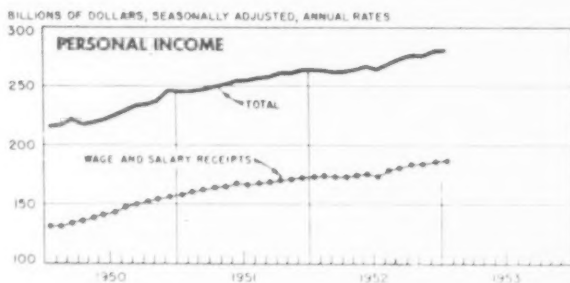
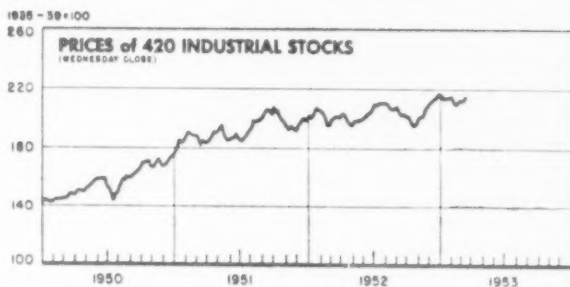
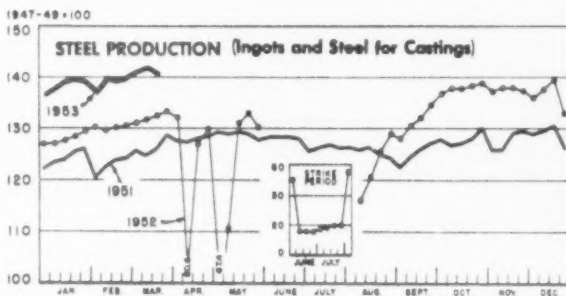
A high administration spokesman said he does not believe a possible settlement of the Korean activities will have any bearing whatsoever on our mobilization program. Other administration spokesmen point out that our defense program is geared to meet a global menace and that our efforts have constantly reflected this view; it has not been geared to the Korean conflict exclusively. Congress has gone along with this view for the last three years.

There is a possibility that a tax concession might be made if the Korean affair is settled. However, the present administration has indicated time and again that defense is of prime importance and that no reduction in effort should be expected for years to come. Some administration spokesmen also point out that our very preparedness may have had a bearing on China's peace proposal.

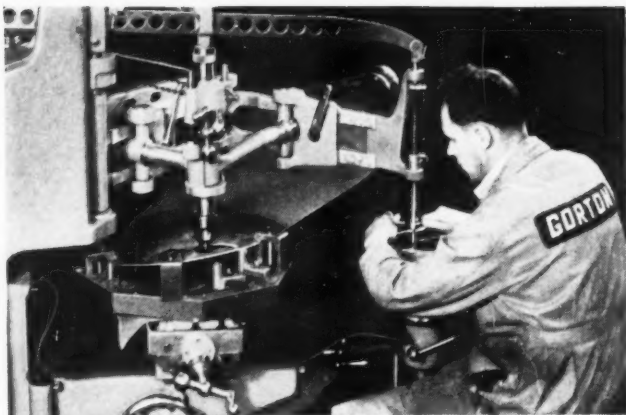
### Steel a Problem

The tremendous demand for steel by the automobile industry is posing several problems for the steel industry. There are those who hold that the present high demand will hold up for the balance of 1953; others

## General Business Indicators



believe there will be a slight downward turn and that other customers should not be slighted in favor of the automobile industry. The latter steelmen believe that it is smarter to spread the steel over as



Tracer-Controlled Pantograph cuts and rounds thermal slot in 8-foot steel propeller blade in 40 minutes; previous time was 5 hours, 10 minutes — just one of hundreds of examples of time and cost saving with tracer-controlled Pantograph machines.

## Pantography IS NEW —

**By George Gorton III**  
Executive Vice President  
George Gorton Machine Co.

— in the sense that industry at large and Metal Working people in particular are just beginning to appreciate the many advantages Pantography offers to those faced with the Design-Production problems of today and tomorrow.

**I**NDUSTRY'S foremost responsibility right now is to produce faster, to highest quality standards and at lower cost — whether on defense contracts or for our civilian needs.

Today, there are literally thousands of operations being performed throughout industry which can be speeded up, improved in quality and lowered in cost by the use of available models of special machine tools. The modern tracer-controlled Pantograph machine is such a tool. It is both a special purpose machine, ideal for short runs, and it is an accurate single purpose machine which turns out identical parts or pieces to meet tight production schedules.

The tracer-controlled Pantograph machine is used for inside and outside profiling, routing, die sinking, mold cutting, counterboring, contour milling, chamfering, grooving, graduating and engraving in ferrous and non-ferrous metals, as well as in plastics.

This machine performs on flat, uniformly curved, cylindrical, spherical or

irregular shapes — it works in either 2 or 3 dimensions, in all directions on a horizontal plane, and vertically. It employs enlarged masters, templates or patterns which are quickly and easily made and operates normally at a reduction ratio thereby increasing accuracy — exclusively characteristic of the pantograph.

Single or repetitive accuracy — from one piece to thousands — manual or full automatic operation depending upon quantities — work sizes from the size of a dime to as large as 10 feet.

A new booklet, "Pantography," explains the process and shows what this type of machine can do for you. It is yours without obligation. Write for it today. If interested, also ask for our latest General Catalog 1655. Address the George Gorton Machine Co., 1405 Racine St., Racine, Wisconsin, U. S. A.



wide a market as possible, even though it means squeezing the automobile makers.

Approximately 11 million tons, or 16.2 per cent of all steel shipments in the U.S. went to the automotive industry in 1952, with shipments running well in excess of this figure the latter part of 1952 and the earlier part of 1953.

#### Industrial Production Record

The Federal Reserve Board announced that industrial production in February soared to a new high and will probably set another record in March. In February the board's index climbed to 239 per cent of the 1935-39 average for the seventh straight month. The March index is estimated at 241 per cent. The increased March figure is based on increased automobile production, the board said.

While auto sales were expanding other lines were following along. Construction increased from earlier levels; retail sales showed improvements and continued at January levels. Appliance sales were holding their own on the levels of last Autumn.

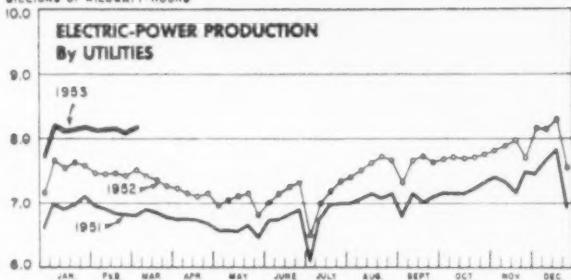
There is no falling off in the industrial and military equipment fields, both continuing at record peak. Output of metals and building supplies was maintained in unusually large volume.

#### Trends in Manufacturing

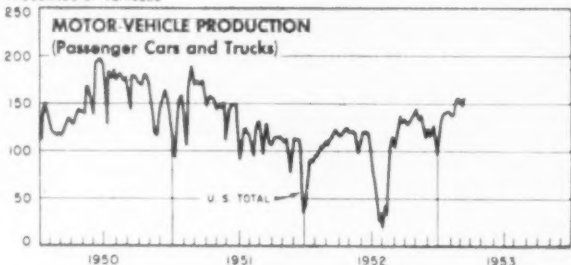
The high rate of manufacturing output in recent months has generally been matched by the rate of incoming orders. Backlogs have held at about \$73 billion since last November—compared to an average of \$75 billion in the third quarter of 1952. The volume of orders to be filled is now three times as large as in the early part of 1950.

### General Business Indicators

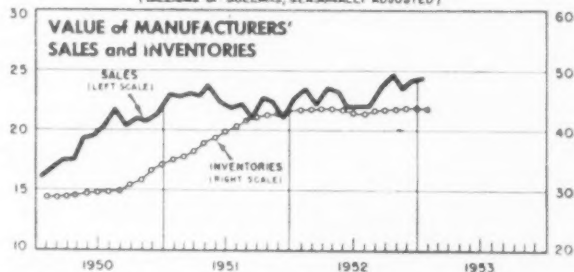
BILLIONS OF KILOWATT-HOURS



THOUSANDS OF VEHICLES



(BILLIONS OF DOLLARS, SEASONALLY ADJUSTED)



The moderate decline in unfilled orders from last September was in part due to seasonal influences and to cancellations of some orders as a result of rescheduling of several armament programs. Movements in recent months, however, point to a flattening out in the trend of manufacturers' backlogs, after an almost uninterrupted expansion in the 27 months following Korea.

The shift from continuous growth of unfilled orders to relative balance between new orders and deliveries is primarily an



"This judge is a stickler for precision. His plant is packed with

## Logan LATHES!"



Logan 940-2  
QUICK CHANGE GEAR  
TURRET LATHE  
11" Swing, 1" Collet Capacity,  
1 $\frac{3}{8}$ " Spindle Hole

**PRECISION MINDED JUDGES** of lathes are selecting more Logans every year for production, shop and tool room work. They like the sustained accuracy of the Logan ball bearing spindle that needs no adjustment for any speed from 45 to 1500 rpm. They like the rugged, accurate, warp-free Logan bed with two V-ways and two flat ways precision ground to a tolerance of .0005". They approve the 11" swing, 1" collet capacity and 1 $\frac{3}{8}$ " spindle hole that provide capacity for most of any shop's metal turning. They keep in mind the fact that no other lathe of comparable specifications can match the Logan in economy. Write for the Logan Catalog.

LOOK TO LOGAN FOR BETTER LATHES AND SHAPERS

**LOGAN ENGINEERING CO.**

4901 West Lawrence Avenue, Chicago 30, Illinois

# Manufacturers' Unfilled Orders and Unfilled Order-Sales Ratios, by Major Durable Goods Industries.

Industry	Unfilled orders (billions of dollars)			Ratio of unfilled orders to seasonally adjusted sales (number of months)		
	Jan. 1950	Jan. 1952	Jan. 1953	Jan. 1950	Jan. 1952	Jan. 1953
<b>All durable goods</b> ....	<b>19.2</b>	<b>63.5</b>	<b>70.0</b>	<b>2.7</b>	<b>5.8</b>	<b>5.7</b>
Primary metals .....	3.8	8.1	8.0	2.9	4.1	3.8
Fabricated metals .....	2.5	5.9	5.8	3.3	4.8	4.1
Electrical machinery .....	2.8	9.0	11.5	4.1	8.5	9.6
Other machinery .....	3.1	12.2	10.1	2.8	5.9	4.8
Transportation equipment	4.1	22.2	28.5	2.6	9.7	9.4
Other durable goods .....	2.8	6.0	6.1	1.7	2.7	2.4

source: U.S. Dept. of Commerce, Office of Business Economics

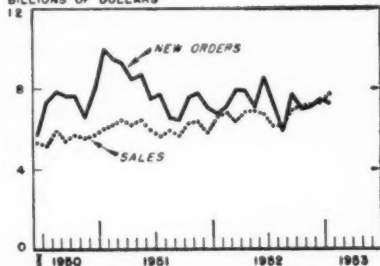
indicator of the progress of the defense mobilization program.

Although it is difficult to ascertain how much of the current backlogs on books of

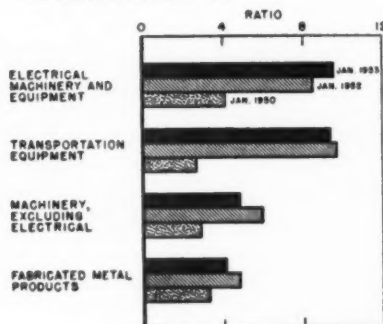
## Metal Consuming Industries

New orders have been about equal to sales in recent months

BILLIONS OF DOLLARS



Ratio of unfilled orders to monthly sales still far above pre-Korean rate



NOTE: DATA ARE SEASONALLY ADJUSTED

manufacturers represented defense contracts, available information indicates that the latter accounted for roughly half the total. Defense contracts outstanding have been on a plateau in recent months as have total unfilled orders.

The recent cessation of advances in unfilled orders has not resulted from any shrinkage in new orders for producers of either durables or nondurables. New business expanded in early fall has since held relatively firm; see table.





# Letters TO THE EDITOR

## Who, if not you?—When, if not now?

As usual I read your editorial, and as usual, I always get something good out of them. In this instance I am very much interested in receiving a copy of the card you found so adequate, Who, if not you?—When, if not now?

Personally, I think the thought is so applicable to everyone, regardless of job or profession, that I would like to send copies of the card to many of my friends. May I have permission to reproduce the card for this purpose?

J. A. Liermann, Manager  
Industrial Division  
The Cordes Supply Company

I was very much impressed with your article that appeared in the January issue of the MACHINE and TOOL BLUE BOOK. That type of writing seems to be what is needed to stimulate thinking among all of us, certainly the responsibility of who is going to do a job and when it is going to be done was summed up in the quotation about which you centered your thoughts.

Could I please have three or four of the cards containing the slogan?

J. R. Gregory, Methods Engineer  
Fisher Body Div., General  
Motors Corporation

Will you please send me a, Who, if not you?—When, if not now? card.

I get much pleasure from your editorials and quite an education from perusing the MACHINE and TOOL BLUE BOOK.

James N. Hill, Group Leader  
Westinghouse Electric Corp.

It was a splendid editorial. We would appreciate a couple of those cards for the office wall. Thanks.

Thomas A. Garvin, President  
Garvin Brothers, Inc.

I would appreciate a copy of the quotation for my office.

C. H. Price, Asst. Plant Eng.  
Shenango Agaloy Tube Co.

*We're still getting requests for the, Who, if not you?—When, if not now? cards as mentioned in the January, 1953, editorial. A few are still on hand for those who want one.*

## Special Reports

Would you kindly send me your special reports on Drilling Machines, six parts. And also, if still available, reprints of: Shapers, Keyseaters, Slotters; Gear Making Machines; and Boring Machines.

F. W. Baker, Jr.  
Bird Machine Company

*A few of the reprints are still available. Of the special report on Drilling Machines we have reprinted 10,000 copies, and sent out 10,000 copies. Another reprint order is on the way to fill further requests for the Drilling report.*

## Tapping

In your June, 1951, edition you had an article entitled, "If You Break Only One Tap a Day You Haven't Licked Your

Tapping Problems." If a copy of this is available, we would appreciate your forwarding same to us . . . believe this would be of considerable interest to us at this time.

G. E. Lundquist, Vice-President  
The Eagle Lock Company

Reprints may be had from Scully-Jones and Co., 1907 S. Rockwell Ave., Chicago 8, Ill. Harry Conn, author of the article, will send you not only a reprint but wall charts and other material to help you with your tapping operations.

### Drilling

We would like to request six reprints of the HSS Drilling Speeds and Feeds Chart on page 252 in your August, 1952, issue of the MACHINE and TOOL BLUE BOOK.

Frank Bub, Ind. Eng. Dept.  
Mine Safety Appliances Co.

### Special Fixture

Some years back a specialized holding fixture was advertised in the MACHINE and TOOL BLUE BOOK for grinding the various angles on tool bits. As I remember it, it was spherical in shape, and universal in its adaptation. Can you give me the name and address of the manufacturer of this holding fixture?

Willard H. Kline  
Quakertown, Pa.

You are probably referring to the grinding fixture made by the Combination Vise and Jig Company, Orfordville, Wis.

### Graphics Boost Machine Production

I would be interested in receiving three reprints of the article appearing in the January issue entitled, "Graphics Boost Machine Production."

Clyde C. Cook, Tool Engineer  
Joy Manufacturing Co.

### Cool Grinding

In the October, 1952, issue we noted with a great deal of interest two articles: "More About Cool Grinding," by H. J. Chamberland, and "Selecting the Most Efficient Abrasive Cutting-Off Wheel," by Harold F. Tucker.

We would greatly appreciate receiving one reprint or tear sheet of each, if possible.

H. J. Prosser  
The Carborundum Company

### Oil and Fire Don't Mix

I'm confident that the users of hydraulic equipment will read with interest the article "How to Keep Your Hydraulic Oil Lines Fireproof," as published in the Blue Book's "Know How" Reference Sheets of the March issue. For the ultimate good of the hydraulic industry, too much emphasis cannot be placed on this subject.

. . . In the Wisconsin area, your article is quite timely in view of the tragic explosion (supposedly due to hydraulic oil vapor) last week in the Ladish Company, which took the lives of three men and did considerable damage to the plant.

Please accept our sincere thanks for the space devoted to a subject we consider important to all industries.

M. E. Engebretson  
The Oilgear Co.

### Silver Brazing

Please send us 12 reprints, if possible, of the following article published in the February, 1953, issue: "Brazing With Silver Alloys," by A. Stanley Cross, Jr.

George J. Lake, Prod. Dept.  
American Instrument Co., Inc.

Because reader demands for the February issue have been so heavy we regret that we can only send three tear sheets of the article. This pretty well exhausts the 500 over-run of the February BLUE BOOK.

### SPECIAL REPORTS REPRINTS

There are still a few reprints of the special report on Shapers, Slotters, Keyseaters available. Because of the limited supply these will be sent out on a first come, first served, basis.





## ***Steel Service Team*** ***In there--Pushing***

Now more than ever the help of an experienced steel-service organization is especially valuable. That's why it may well pay to get in touch with the nearest Ryerson office or plant.

Not that we can *always* furnish the steel you need—much as we would like to, and hard as we try. But, with controls relaxing a little and a few steel products coming into better supply, there are more opportunities for experience and ingenuity to take over. And exper-

ience, ingenuity—and the will to help are never in short supply at Ryerson.

With all Ryerson plants cooperating, and with Ryerson specialists helping to make the most of available steel, we are usually able to maintain service in spite of the current situation. So we suggest that you check with us regularly for your steel requirements. . . . Nothing is too difficult when it comes to working with a Ryerson customer.

**Principal Products:** Carbon, Alloy & Stainless Steels—Bars, Structurals, Plates, Sheets, Tubing, Machinery & Tools, Etc.

# **RYERSON STEEL**

Joseph T. Ryerson & Son, Inc. Plants at: New York • Boston • Philadelphia • Cincinnati • Cleveland • Detroit • Pittsburgh • Buffalo • Chicago • Milwaukee • St. Louis • Los Angeles • San Francisco • Spokane • Seattle

## Machining Operations on the New 280-Millimeter Artillery Piece

PRODUCTION of complex carriage assemblies for the Army's 280-millimeter gun, capable of firing an atomic shell, necessitated considerable ingenuity in adapting existing machine tools to perform unique operations.

The carriage is made up of alloy steel weldments ranging in length to 38 ft. 6 in. It is designed to be suspended between two transporting vehicles and can be emplaced and fired quickly. Weight and stresses imposed on the carriage in transit, as well as the shock of recoil, dictated that it be built with high structural strength.

One of three prime contractors to the Ordnance Department for production of these assemblies is Dravo Corp., Pittsburgh, Pa.

The number of carriages on contract did not warrant development of special machine tools and extensive production line technique. Urgency of production was another factor that made such considerations impossible.

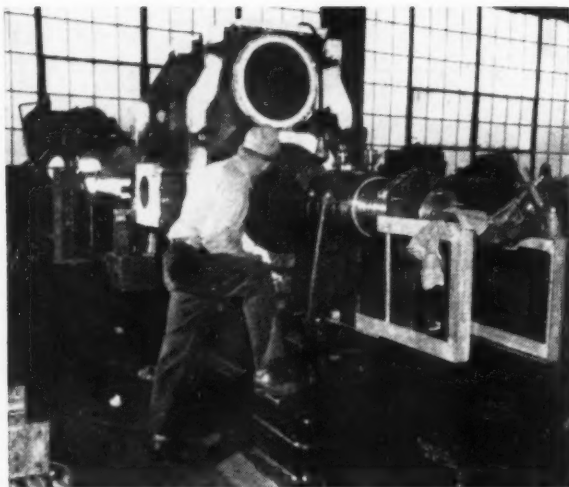
One of the unusual machine tool

By **D. A. Booth**

General Mechanical Superintendent  
Engineering Works Division  
Dravo Corporation  
Pittsburgh, Pa.

adaptations was to perform a number of boring operations on the gun cradle, second largest component in the assembly. The cradle consists of a main tube casting to which is welded trunnion forgings, plate reinforcing, and mountings for recoil and buffer cylinders, elevating rack and loading platform.

In view of the production requirements of this contract and that of other high priority jobs concurrently being processed in Dravo's machine shop, it was apparent that schedules on the cradle tube could not be met with avail-



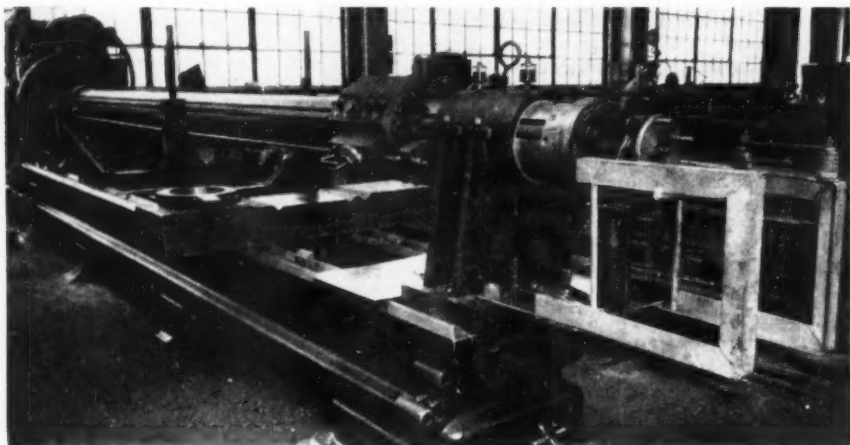
1. Cuts of  $\frac{3}{8}$ -in. depth and .025-in. feed were made in the tough alloy steel casting by Cobalt Hi-speed tools on the special lathe rig.

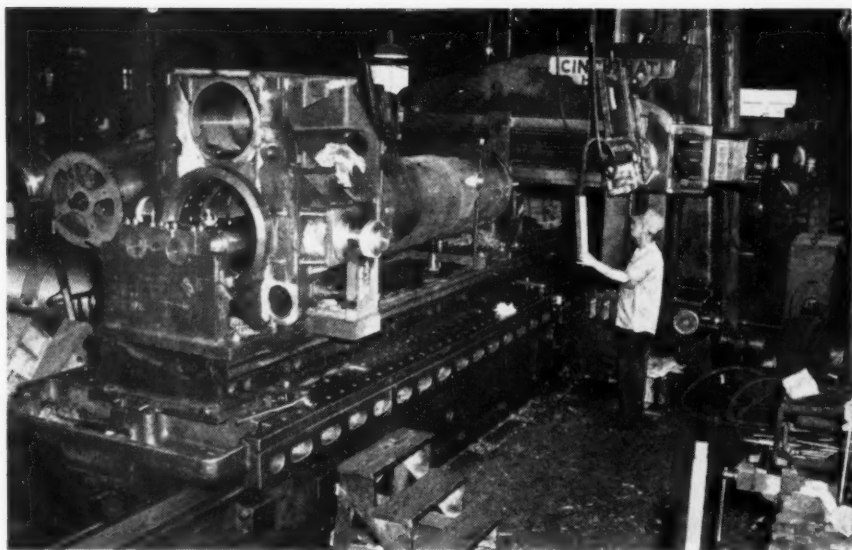
able horizontal boring mill equipment. Therefore, it was decided to accomplish the time consuming preliminary boring of recesses and counterbores for seals and bronze liners with a traveling-head boring bar mounted on a lathe, figures 1 and 2.

The bore, a minimum of 22 in. di-

ameter by 13 ft. long, required a sturdy bar to rough and finish accurately the sand-cast alloy steel casting. Such a bar was made from a 10 in. by 19 ft. hex shaft which was left over from an old paddle-wheel river towboat. A planer was used to take off the square corners of the shaft and feed screw recesses

2. Traveling-head boring bar mounted on a lathe was developed to perform preliminary boring operations in the cradle tube assembly of the weapon.





**3. Keyway cuts in the cradle tube** are made on a planer by the draw rod which is attached to the rail of the machine. Cutting is performed during the normal return stroke of the machine.

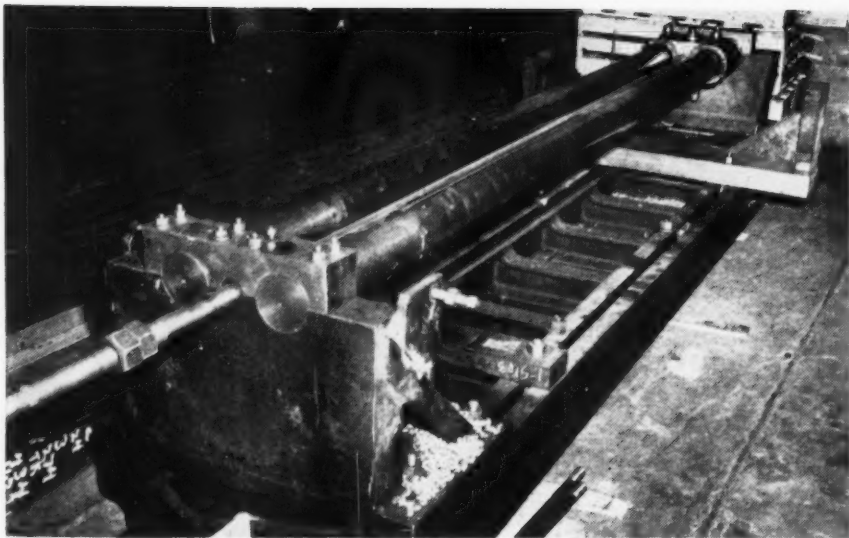
were cut. A lathe was then employed to finish-turn and polish the bar to 9- $\frac{7}{8}$  in. diameter.

Steel slab which was readily available was used instead of cast iron to make the split boring head. Bronze was electric welded in the rough bore to form a dam for a poured babbitt bearing surface. The split halves were bolted together and finish bored to bar size. The tool holder was mounted on the boring head and constructed in such a manner the tool could be advanced by rotating a rod extending the length of the bar. This rod was circumferentially calibrated to enable advancement of the tool by increments of .001 in. for accuracy in boring recesses deep in the bore. Feed screw in the bar was the transplanted lead screw of the lathe on which the bar was mounted. Feed box on the bar was borrowed from a

4- $\frac{1}{2}$  in. portable boring bar ordinarily used to bore stern tubes and struts for riverboats.

The combination of the lead screw and feed gearing resulted in a minimum feed of .050 in., which was deemed excessive for surface finish requirements of the work and the power and age of the lathe. To overcome this problem, a trip mechanism was developed which, when actuated by a cam on the bar, reduced the feed to .0125 in. through a star wheel. Babbitted bearings in which the bar operates were bored in place on the lathe. To cancel out inaccuracies of the lathe, the bar drive from the chuck was floated.

With the gun tube cradle clamped to the bed of the lathe, cuts of  $\frac{3}{8}$  in. depth and .025 in. feed in the tough casting are made with Cobalt Hi-speed tools.

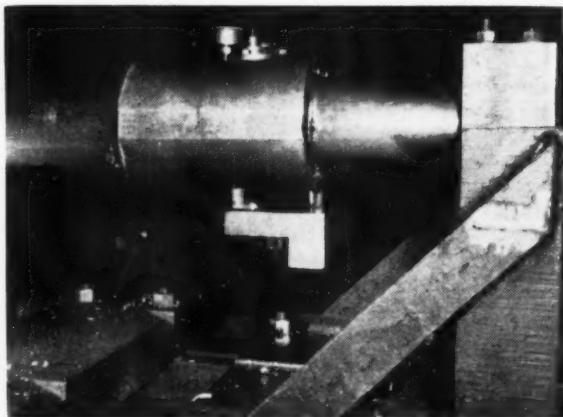


**4. This rig was designed especially to cut a blind keyway 10-ft. long through the cradle tube. The tool head is assembled to slide in two turned and polished 6-in. diameter bars mounted on the runway of a scrapped horizontal boring mill.**

After riveting bronze liners into the recesses machined in the tube on the Prentiss lathe, final boring of the liners, and boring for recoil buffer cylinders and various milled reference spots, are

completed on a 6 in. horizontal boring mill. Limited time available on the horizontal boring mill made it necessary to drill and tap a number of holes in the cradle on a drill press with an

**5. Closeup shows the tool head and arrangement for small clapper-box to which tools of varying widths are affixed for cutting the keyway. Down-feed is accomplished by ratcheting the screw at each stroke.**



# YOU

CAN DRILL OR TAP TINY, PRECISION HOLES

... ON A PRODUCTION BASIS ... WITH

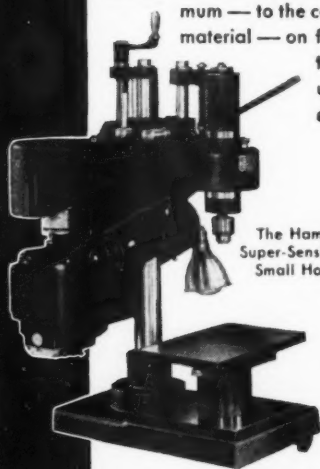
MINIMUM SCRAP AND MINIMUM TAP AND DRILL BREAKAGE

BUT YOU **MUST** FIT THE TOOL TO THE JOB

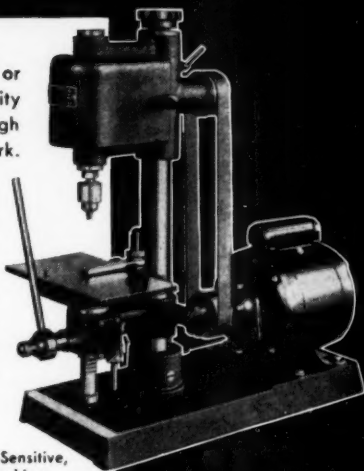
When your job calls for tiny, precision holes, drilled or tapped, rely on this; such holes can be produced in quantity and within allowed tolerances only on super sensitive, high precision machines **designed and built** for this class of work.

**HAMILTON Drilling Machines and Tapping Machines** are super sensitive and extra accurate; **designed and built** for the production of tiny, precision holes. The drilling machines produce holes up to 0.3125" maximum — to the center of 10" — in any drillable material — on fast production schedules. The

tapping machine is designed to use the smallest and finest tap and up to 10-32 inclusive.

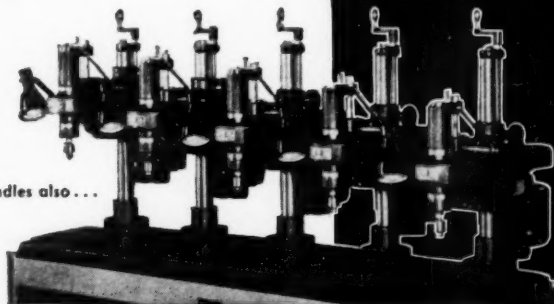


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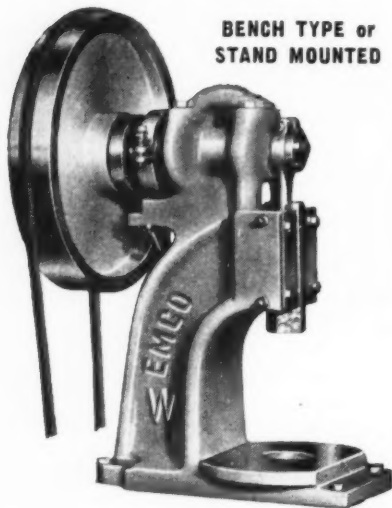
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Several other machining operations of an unusual nature were performed by special setups on existing tools in the Dravo shops, to produce these carriage assemblies.

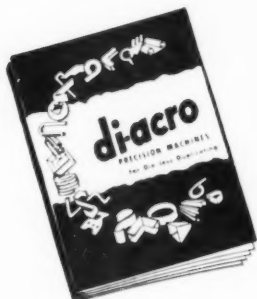
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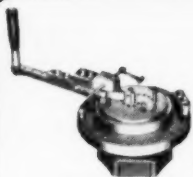
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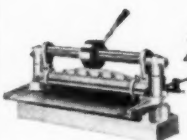
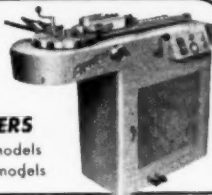
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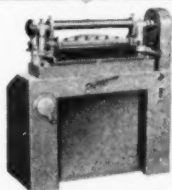
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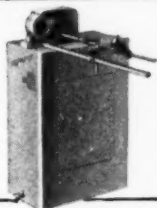
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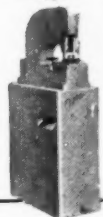
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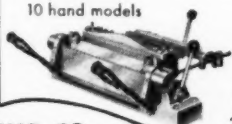
### PUNCH PRESSES

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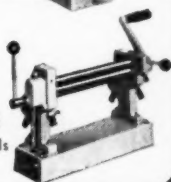
### BRAKES

10 hand models



### ROLLERS

2 hand models



# Unusual Machining Problems Solved by Borg-Warner's Detroit Gear Division

By **Harry H. Whittingham**, Vice President  
Detroit Gear Division  
Borg-Warner Corporation  
Detroit, Michigan

PRESENT AUTOMATIC transmissions are probably the most complicated and intricate pieces of mechanisms in our automobiles today. Many years of research and development and millions of dollars lie behind the present Detroit Gear Automatic Transmission. While the actual operation of the transmission is interesting I do not think an understanding of the functions of the various parts is essential to an appreciation of the manufacturing techniques, consequently I shall limit myself to the more unusual problems which we've had to overcome.

## General cleanliness

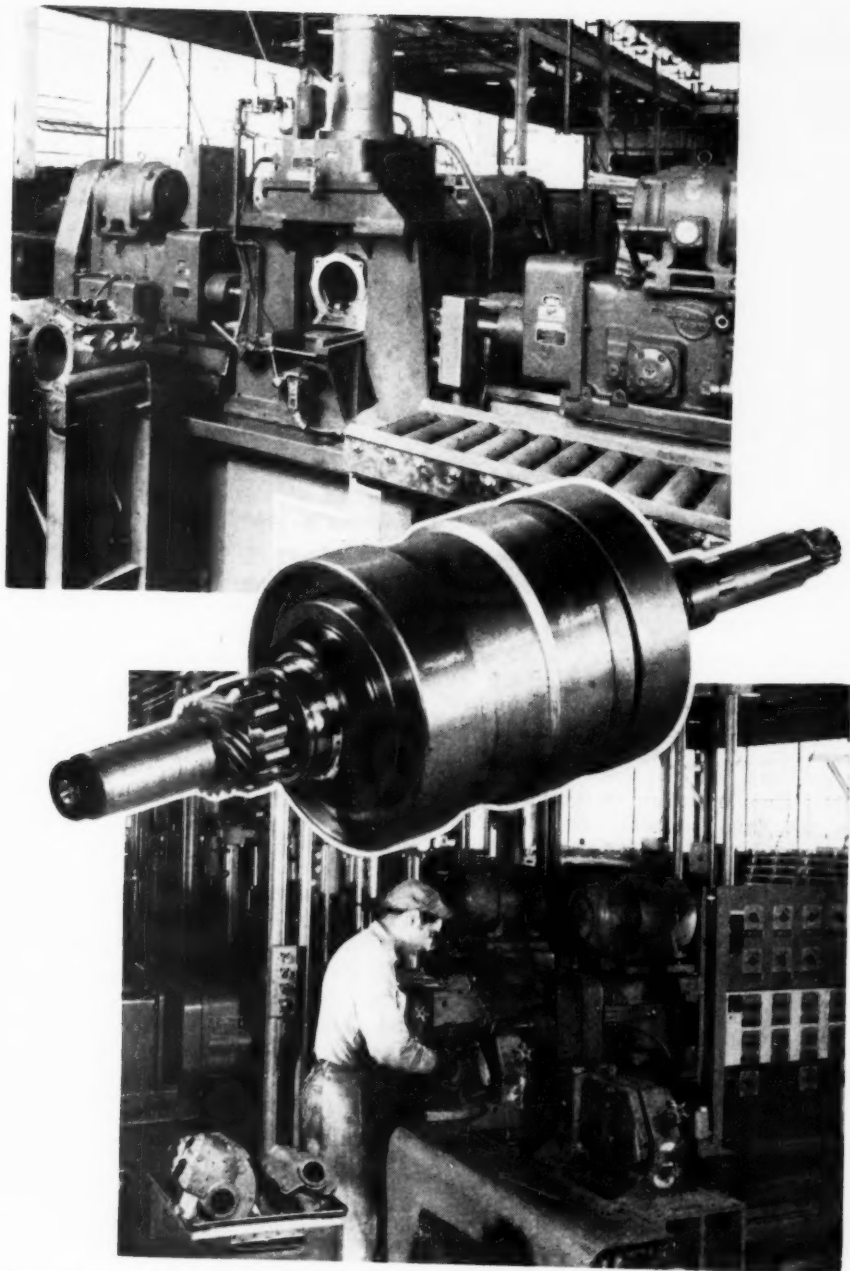
We found that we would have to manufacture and assemble 330 different part numbers going into the assembly with a tolerance of only  $\frac{1}{2}$  gram of foreign matter permitted. Actual current production is averaging about  $\frac{1}{4}$  gram as testimony to the thoroughness of our methods. In relation to the total

weight of the transmission, this is one part in 336,000.

The first step was to insure receipt of exceedingly clean castings, with rigid inspection to see that all core sand, scale and teats were removed. This called for development of improved foundry practices as well as a number of unique cleaning methods to accomplish our goal with reasonable economy. These are largely shot blast cabinets that have been tooled for single purpose operations at various points in the line.

Assembly rooms are all pressurized and air-conditioned. Dust is kept down during working hours by use of a vacuum cleaner to keep floors clean without raising dust and they are washed between shifts each night, figure 1.

No air hoses, rags, wood, leather hammers or any fibrous material which can break up into foreign matter and get into the parts and valves in the



May, 1953



1. All assembly rooms are pressurized and air-conditioned. Floors are kept clean during working hours by means of vacuum cleaners. The automatic transmission is assembled with a tolerance of only  $\frac{1}{2}$  gram of foreign matter permitted. Current production averages only  $\frac{1}{4}$  gram.

transmission are permitted in the assembly room.

All parts are conveyed through the plant from operation to operation and to the final assembly line in wire baskets. A supply of these are made up especially for each part. They stack easily and are easily loaded on tray conveyors. Since they have no closed bottoms they do not accumulate dirt; they have no wooden pegs from which splinters could peel off to find their way into the transmission. In going through the washing machines water flows freely, not only over the parts but through the basket removing all dirt from both. They mean a great saving in handling material, and above all, have so protected our gears, while in the green, as to reduce the well-known problem of nicks to the vanishing point, figures 2 and 3.

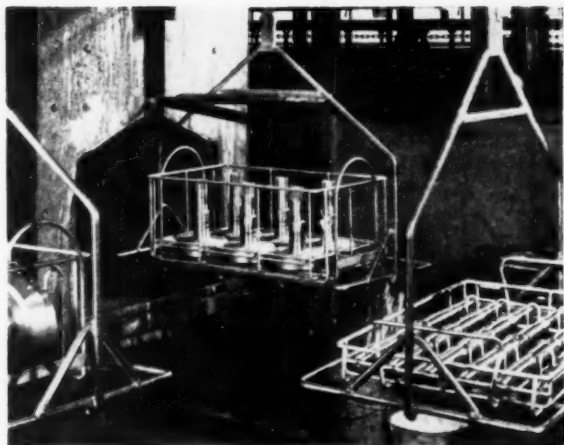
We have to remove all burrs to a degree far beyond that normally associated with automotive production. On all parts where there is any possibility of fine hair-like burrs coming loose under operating conditions we perform many operations to be sure to remove them. These vary with the part but the various methods are: filing or scraping by hand, wire brushing, stone tumbling and by corn cob and walnut shell blasting.

We also encountered a problem of leaks because of the 27 to 200 lb. pressures in the transmission. Castings obviously must be held free from porosity.

Numerous leak tests were developed at different stages of the operations. Some were pressure tests and some, such as on the oil pan, were vacuum tests. After the transmission is completely buttoned up we fill it with oil

**2. A wire basket is made up especially for each part.**

This promotes cleanliness and avoids danger of splinters and other foreign matter from getting into the parts. Also note that the baskets have no bottoms, which prevents the accumulation of dirt.



and apply a pressure test on the entire unit for leaks just before shipping, figure 4.

**General considerations**

The requirements of road clearance and compactness of design means holding all diameters down to minimum. The effect of this on our mainshaft design will be seen later. Since this transmission must be designed for universal use in the trade, it must meet a wide variety of conditions. One such condition is the high speed engines with which it is now being used in some European cars. Such speeds as 6,000 r.p.m., and more, require very careful balancing. Parts that cannot be machined all over, such as the two carriers, are dynamically balanced on Gisholt balancing machines to tolerance of  $\frac{1}{2}$  inch/ounce.

A new level of noise standard is demanded by purchasers of automatic transmissions. All of our gears are pre-shave roughed on multiple-spindle hobbors or shapers to close tolerances and are finish shaved. This includes the two internal ring gears. The internal gear of the front pump is broached. In the main gear set the gears are nitro-carburized in atmosphere controlled

continuous type furnaces. The ring gears are all quenched in Gleason quenching presses to maintain roundness. We have tooled the gears to bring their mounting locations in close relation to the p.d. of the gears by the liberal use of Woodworth diaphragm chucks locating on the p.d.'s and grinding holes and

**3. The wire baskets are easily stacked and quickly moved about the plant from operation to operation.**





**4. Pressure oil testing for leaks.** Because of the pressures in the transmission, leaks are a definite problem which had to be solved by new casting methods and changes of design. Some of the parts are vacuum tested, others are pressure tested.

diameters to close concentricity tolerances.

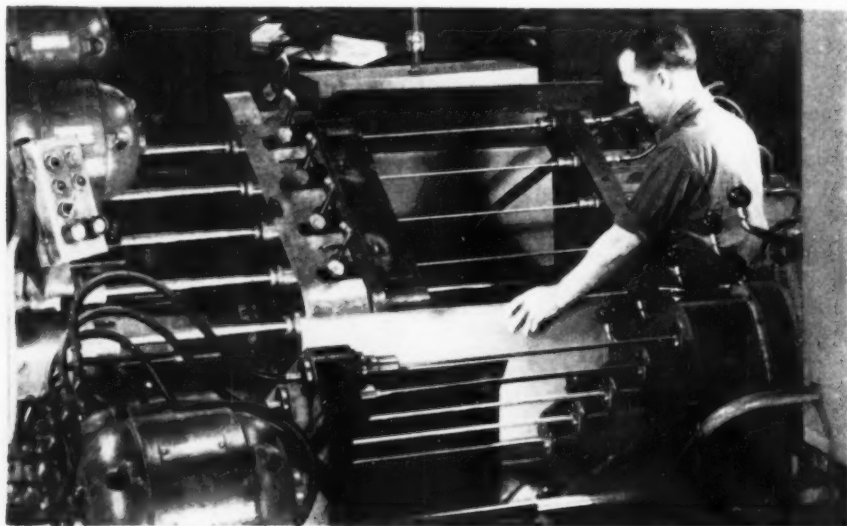
Close control over involute, lead and spacing errors is maintained through the use of a completely equipped and

modern gear checking room and a close routine check of every gear setup.

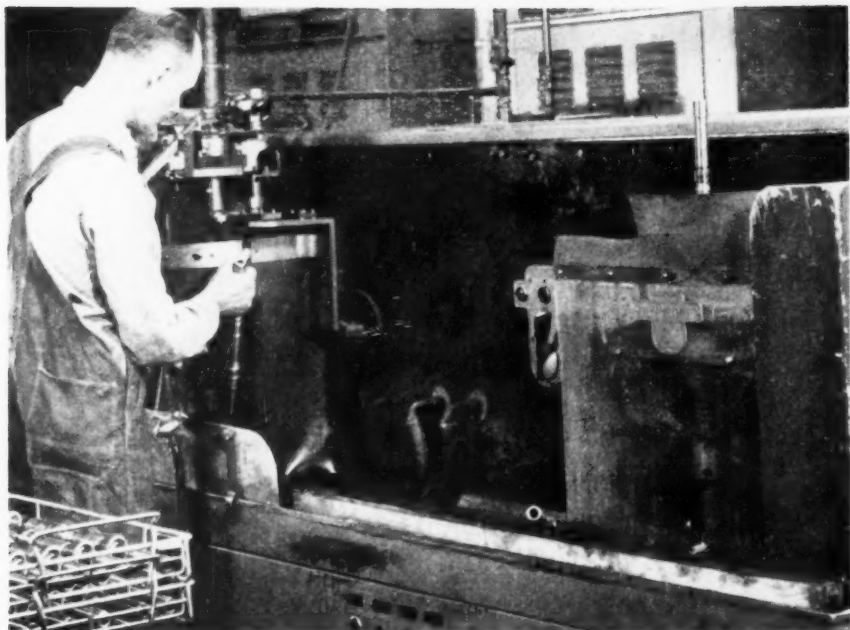
### **Mainshaft**

Our mainshaft will probably prove to

**5. A 14" hole is gun drilled** through the center of the mainshaft. We use a Barnes gun drilling machine for this operation. The drills are held stationary and the parts are rotated at 1500 r.p.m. A better finish and closer tolerance was obtained by gun drilling than by previous methods.







**6. The mainshaft is induction hardened.** Note the two stations on this unit: in the station on the left the shaft is rotated and fed through the coil and quenched by the scanning method; in the right hand station the shaft is rotated only and immediately quenched in place.

be one of the most interesting to you. It presented many new and difficult problems to us. It is unusual in that it extends the full length of the unit, from the flywheel to the universal joint flange. The requirements of the part are that it must have the strength to absorb the full power output; it must also be of minimum diameter to hold to minimum the size of the parts surrounding it; furthermore, hydraulic pressures to the front clutch, the second speed clutch, and the converter and pressure lubrication to the gears, bearings and over-running clutches is all distributed by the mainshaft.

It is made of cold extruded bar stock

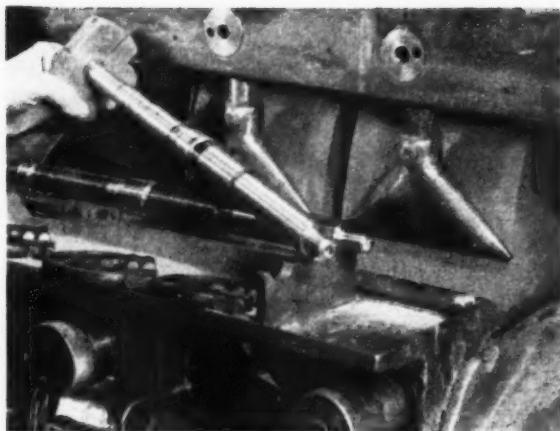
of SAE A-9645. The bar stock is heat-treated at the mill to 19-24 Rockwell "C." The subsequent cold working increases the hardness to 38-32 Rockwell "C." The only subsequent heat treatment is localized induction hardening which will be described later.

The cold extrusion process is very economical as it leaves a minimum amount of material to be removed. One turning operation is sufficient to control size for subsequent grinding.

In order to distribute oil pressure, as mentioned, it is necessary to drill a 14" hole through the center of the shaft. The tolerance in this three-step hole is .001" in order to hold the two



**7. Five bearing diameters** are ground at one time. These diameters are held to .0005" tolerance for parallel.



valves which are assembled into it. This hole is drilled in a five-spindle special Barnes gun drilling machine. The drills are held stationary and the part is rotated at 1500 r.p.m. with two machines. One operator can produce 52 pieces per hour. Originally, we planned to ream this hole. We experienced considerable trouble holding the three steps to size with the reamers, nor did we attain any reasonable reamer life. As so often happens, necessity became the mother of invention. We tried gun drilling to size and found that we got better finish and closer tolerance, figure 5.

As previously mentioned, the only heat treating on this part is induction hardening which is required at three points only, and that is on bearing diameters. It was undesirable to heat treat the shaft all over as toughness was desired in the other sections. Due to its shape, straightening was most certainly to be avoided. The hardening is done in a No. 1400 Detroit thermionic high frequency unit induction heater. You will note two stations. In the one on the left the shaft is rotated and fed through the coil and quenched by the so-called scanning method. An interruption, when half-way through the coil, produces the two sections of heat

treatment. In the right hand station, the shaft is rotated only and immediately quenched in place. Due to the various holes and grooves in the shaft, it was necessary to control length of heat treatment and depth very carefully. These are held within .035" to .050" for depth and  $\frac{1}{8}$ -.0 for length. Hardness obtained is 60-63 Rockwell "C," figure 6.

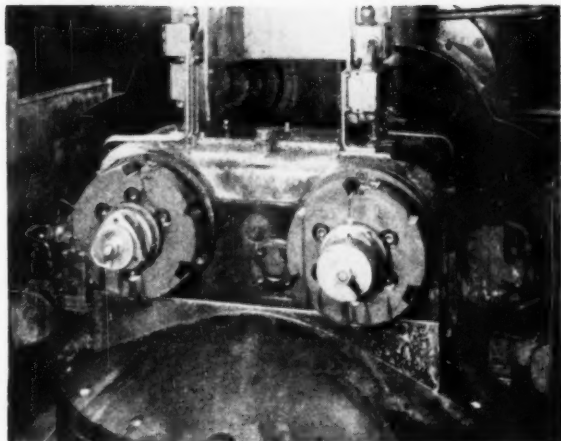
The grinding of the bearing diameters is done on Landis grinders. Five diameters are ground at one time. There is no longer anything too unusual about this operation except that its success depends on the design and accuracy of the wheel dresser. These diameters are held to .0005" tolerance for parallel, figure 7.

### **Main shaft valve**

Another unusual operation is the securing of the two valves in the shaft. One valve is an aluminum die casting and the other a bronze die casting; hence, are relatively soft. Originally, we pressed the valves into the hole, using a lubricant, but scratches thus produced caused oil leakage which affected the functioning of the transmission. We finally solved this problem by submerging the valves in liquid

#### 8. Milling the pinion slots and planet carriers.

Machine mills two carriers while two others are being loaded. The fixture is mounted on a turntable which indexes 180 degrees. Carbide milling cutters are used and slots are held to .001" parallel.



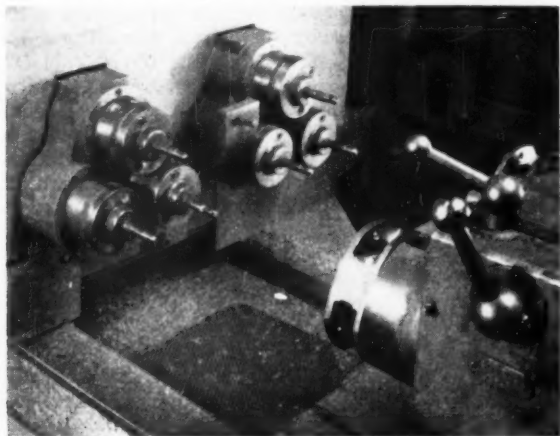
nitrogen (-80 deg.) which produced a shrinkage of about .001". This permits the valves to practically drop free into the hole. When they thaw out we have a metal to .001" press fit. No leak occurs at high oil temperatures as the valves expand more than the steel and tend to make a tighter seal as temperatures rise.

#### The planet carriers

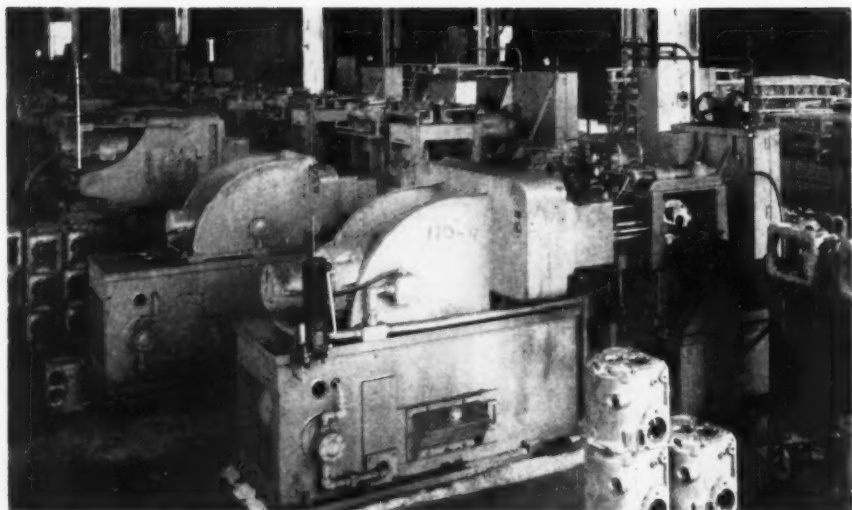
The two planet carriers are of conventional design and are made of malleable iron. One point of interest is

the milling of the pinion slots. This operation is done on a special Cross milling machine, milling one of each carrier at a time while two are being loaded. There is automatic indexing for each of the three slots. The fixture itself is mounted on a turntable which indexes 180 degrees. We are using carbide milling cutters and are holding the slots to .001" parallel in one operation. No further operations are performed on the slots. See figure 8.

The 3 pin holes in these carriers are held to .002" on centers between each



9. Most effective method we have found for producing three pin holes in the carriers was by drilling with fixed-spindle drill heads, precision made to close tolerances, and then boring these holes with cluster, precision made heads.



10. The transmission case is machined on a progressive type of transfer machine. The first operation is performed on Davis rotary mills, followed by machining on Bausch transfer equipment, here shown; 217 operations are performed with three men, assisted by one setup man.

other and the center of the splined hole, and .0012" in 2 inches for parallelism, and .001" on hole size which is common in all planetary gearing. The most efficient method of producing these holes was by drilling with fixed spindle drill heads, precision-made to close tolerances, and then by boring these holes with cluster, precision-made, heads two pieces at a time. Production is 104 pieces per hour. See figure 9.

We have found the precision-made cluster boring heads to be superior to indexing methods. When their center distances are established they can be maintained, and the problem of maintaining the indexing mechanism, with its wearing parts, is eliminated.

#### **The transmission case**

The transmission case is machined on a progressive type of transfer equip-

ment, which is today considered more or less standard equipment. The first operations are performed on Davis rotary mills, followed by Bausch transfer equipment in 3-stages; 217 operations are performed with three men assisted by one setup man. The pre-setting of tools on the Cross Tool-O-Meter reduces change-over time to a minimum. The main bores are qualified on Heald diamond boring machines operated in pairs. The final operation finishes face front and rear ends, which are held square with the bore and parallel to each other within .002" t.i.r. This is accomplished on a Bullard with a production of 47 pieces per hour, see figures 10 and 11.

#### **Governor housing and Servo cylinders**

In the Detroit Gear Automatic the governor, rear pump and speedometer

drive are housed in a separate casting and the servo cylinders are mounted on the sides of the case. In order to prevent leakage at these joints, extreme flatness is required. The faces of all these castings are ground on a Besley-Bowen Grinder. Flatness is held within .003" t.i.r. We are loading one set of fixtures while the second set is being operated. The action of the grinding wheel itself is such that it is self-dressing. Net production is 141 pieces per hour, figure 12.

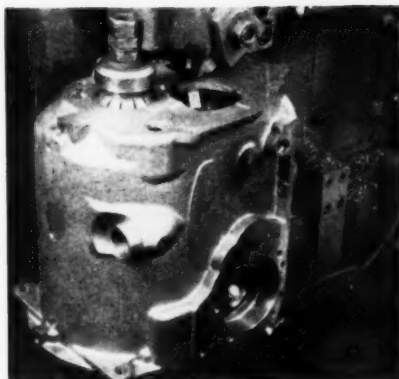
### Front pump

This is of the conventional internal-external gear design and no special machines are being used. We rough out the pump body on a type "K" Bullard Multi-Matic. The gear pockets are precision bored on Healds, holding the depth to .002" and flatness to .001".

In order to hold pump pressure and volume the end play between the pump gears and the cover must not exceed .002". Originally, we made selective fits in assembling the pump gears in the body. Experimentation showed that it was much more economical to lap the pump gears to a .0002" to .0003" tolerance and eliminate the selective fitting. This is done on a Norton lapping machine with net production of 200 gears per hour.

### Free wheel races

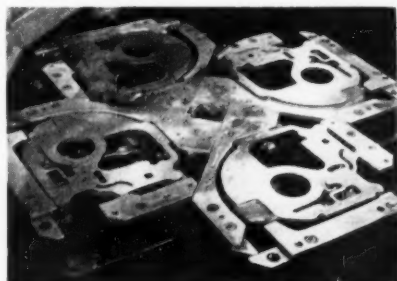
The second speed and reverse torque reactions are taken through over-running clutches which are fastened to two drums. In the experimental models these drums were of high carbon steel to provide the necessary hardness in the I.D. which forms the outer race of the free wheels; the latter are locally hardened to 60 Rockwell "C," while the drum is left soft. This was obviously too expensive for production and, in addition, cast iron is a much better material for the brake drums. An interesting solution to this problem was found. The drum was made of grey



11. Final operation on the machining of transmission cases is done on a Bullard which finishes the front and rear ends at a production of 47 pieces per hour.

iron and the outer free wheel race ring of high carbon bearing race steel with a serrated O.D. Originally, the drum was expanded by heating and the heat treated ring pressed in. Later it was found to be just as satisfactory to press the ring in place without heating.

12. Grinding the casting which houses the governor, rear pump and speedometer drive. Extreme flatness is required. One set of fixtures is being loaded while the second is in operation. The action of the grinding wheel is such that it is self-dressing.





13. Free wheel outer race being pressed into drum.



14. Riveting the sun gear to the lock-up drum. A special machine was developed wherein two parts are loaded into a fixture and the rivets hopper-fed to their positions. Here they are staked sufficiently to hold them in place while the assembly is turned over for riveting; this is done on a shuttle-type die under a conventional crank press.

The serrations cut their own grooves in the iron and deposit the chips in a recess provided at the bottom of the hole. The I.D. of the ring is then ground to .0005" tolerance on Heald internal

grinders with a production of 41 per hour, figure 13.

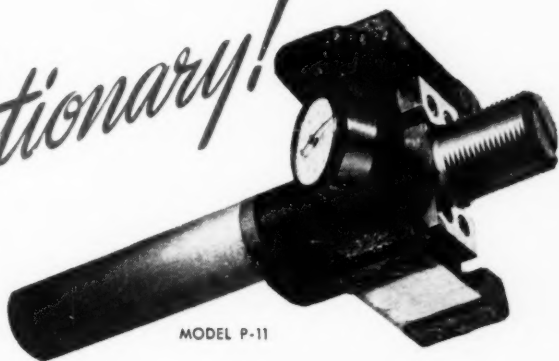
### Front sun gear assembly

The front sun gear is riveted to the lock-up drum. At the riveted joint we must maintain a seal adequate to hold 80 p.s.i. operating pressure. We use six rivets to assemble these parts. This presented an expensive operation due to the inaccessibility of the holes. The rivets were coated with heavy grease to hold them in place while the assembly was turned over and riveted. Through the help of the Detroit Power Screw Driver Company we were able to develop a machine in which we load the two parts into a fixture; the rivets are hopper-fed to their positions and staked sufficiently to hold them in place while the assembly is turned over for riveting. This is done on a shuttle-type die under a conventional crank press. All rivets are upset simultaneously. This method has proven



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very successful from a production and cost standpoint, figure 14.

### Final dynamometer test

Each transmission has a final test on the dynamometer which takes about 7 minutes. Input speeds up to 4500 r.p.m. are available. The transmission is tested for every functional operation and for noise. Hot filtered oil is circulated through the transmission during test. Oil temperature is held at 150 degrees but a grade of oil is used which at this temperature gives a viscosity equal to the type "A" oil, specified for use in the transmission at 250 degrees.

The transmission is tested without the oil pan which gives the discharge oil free exit and return to the filters so that fresh oil is constantly being pumped through the transmission during test. This automatically tends to further cleanse the unit of foreign particles.

The oil pan is then assembled and the complete unit pressure tested as previously described.

This material was presented by the author at the SAE National Production Meeting, Cleveland, Ohio, March 25-27. It is herewith reprinted through the kind permission of the Society of Automotive Engineers and Mr. Whittingham.

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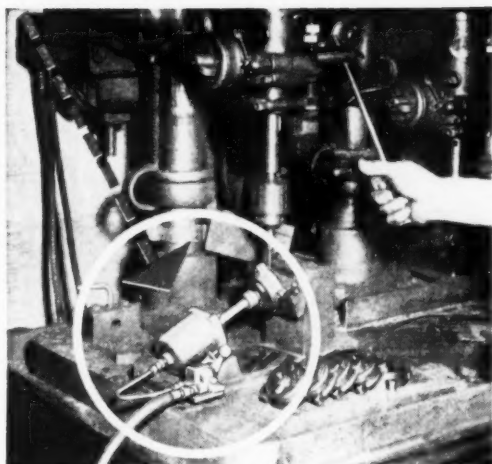
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## Foremanship Forum

### The Practical Joker Isn't so Practical

By **Edmund Mottershead**, President

Mottershead Associates

Cartoons by **Gluckstein**

THERE COMES a time in every foreman's working life when he runs smack into a professional practical joker. What he does and what he doesn't do under this kind of fire may very well determine what kind of effective control he will be able to exercise over his department.

It is true that a certain amount of horseplay among workers will exist as long as American industry does. However, there is a sizable difference between normal horseplay and the situation a fanatic practical joker can create. A certain amount of kidding among workers is often an indication of good personnel morale and cooperation, but an extended wave of hotfoots, lunchbox "plants," and all the other standard gags invariably leads to petty quarrels among the workers. Worse yet, the overzealous practical joker sometimes accidentally causes violations of safety

regulations and even injuries to some of the employees.

In almost all cases where horseplay is overdone, you can trace most of it back





to one man. Often the man is well meaning enough, as Mort was, but the situation he starts gets beyond his control. Obviously, the easiest way to prevent such an uncontrollable situation is to nip the whole business in the bud before it has a chance to pick up real momentum.

Mort made a big hit with the men when he first started working in the shop. He was one of those big robust guys with a hearty laughter and a good word for everyone and everything. For Mort, life consisted of one guffaw after another.

He was a good worker, too, and his foreman, Jack, was pleased over getting him into his department. However, it wasn't long before Jack began to see that there might be trouble if Mort were left to go his own way. Mort's gags were harmless enough, but what bothered Jack was that there were so many of them in so short a time. He had seen this kind of kidding pop up and die away hundreds of times, but he saw that this situation wasn't abating in the least bit. When most of the men had wearied of the sport and were ready to call it quits, Mort would dream up some new stunt and get the ball rolling again.

How did Jack react to all this? First, he never got involved himself in the

horseplay. He didn't expressly forbid any kidding around, but he carefully avoided either becoming a party to any gag or too enthusiastically appreciating anything that was done. He retained and reinforced his position of authority, so that none of the workers (especially Mort) could possibly think the organized gagmaking had any kind of official sanction.

He was even more careful than usual about seeing that on-the-job time was being spent on the job. When some gag was pulled off, he quickly directed the men's attention back to the job at hand and didn't give them a chance to fall into time-wasting habits by constantly planning "something new."

By these means, he managed to keep most of the men from getting involved in a vicious circle of constant cutting up. But he still had Mort to deal with, for the big fellow wasn't the least bit discouraged by the lack of wild approval from Jack or the absence of complete cooperation from the other workers. He blithely continued dreaming up new gags and seemed to be having a good time over it all.

Then Jack felt the only answer was a



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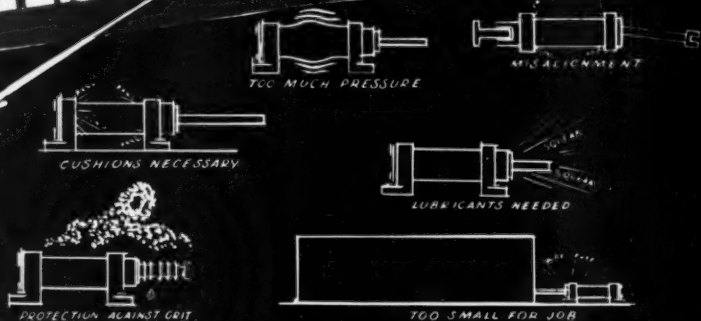
private talk with Mort in his office—not a thorough bawling out, but an honest discussion with the man. He didn't try to dream up any psychological tricks or soft-soaping techniques; he just wanted to be frank with the guy.

"You've been around for a few months now, Mort," he began, "and I thought it was about time we had a little talk. I think you've got what we need in the shop, and there's no doubt in my mind that you'll work out fine."

"Well, I like it here, too," Mort boomed.

"That's fine, but I think there's one thing we ought to thrash out right here. I'm talking to you frankly because that's the way I like to work things out with the boys. I know you can understand that. It's this gagging around, Mort. You know me well enough by now not to think I'm an old lady about having a little fun now and then, but there's got to be a limit to the horsing around if

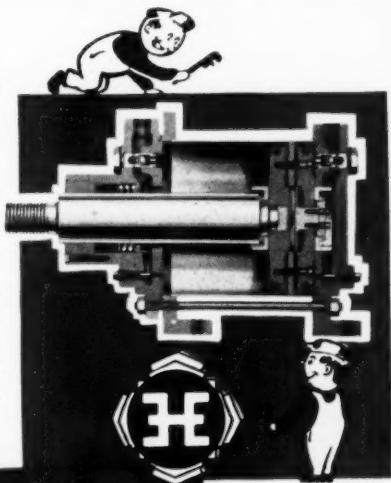
# Here's how to make CYLINDERS LAST LONGER



**WHEN YOU INSTALL** air cylinders, you want to insure long life and trouble-free performance. That's why it pays to use cylinders of ample capacity and operating pressures that do not exceed maximum cylinder ratings. Improper cylinder mounting styles and misalignment of the piston rod with the load often cause trouble. Where atmospheres contain moisture or abrasive dust, piston rod protective boots should be used. Filters and lubricators help insure clean lubricated air—essential to smooth cylinder and valve operation and long cylinder life. Speed control valves and standard or "super" cushions may be advisable, particularly in moving high inertia antifriction loads.

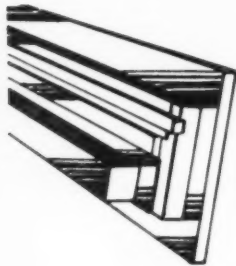
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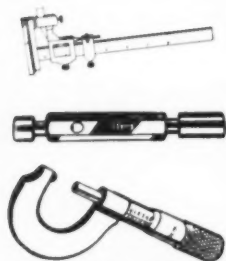


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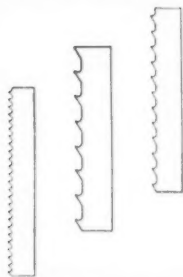
1754 ELSTON AVENUE • CHICAGO 22, ILL.



TOOL STEEL



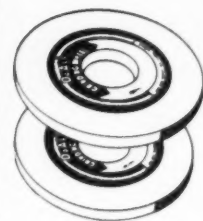
GAGES



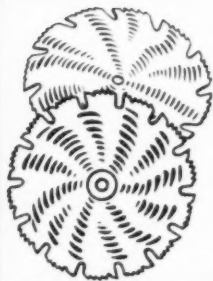
SAW BANDS



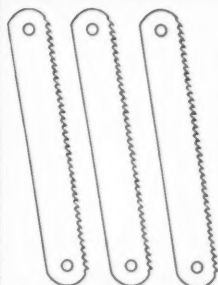
CUTTING TOOLS



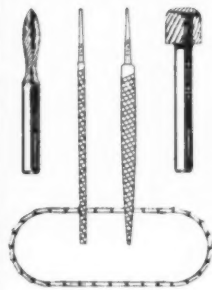
GRINDING WHEELS



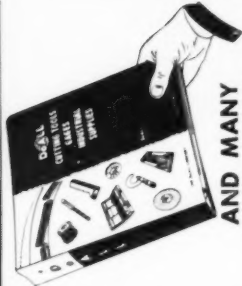
CIRCULAR SAWS



HACK SAW BLADES



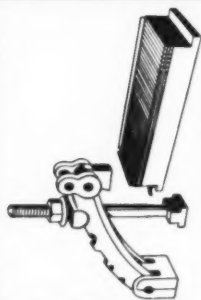
FILES



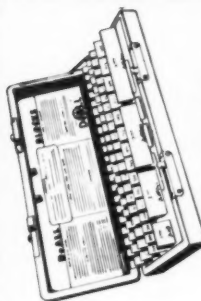
AND MANY OTHER ITEMS



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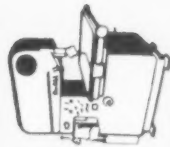
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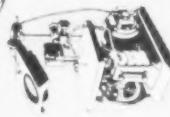
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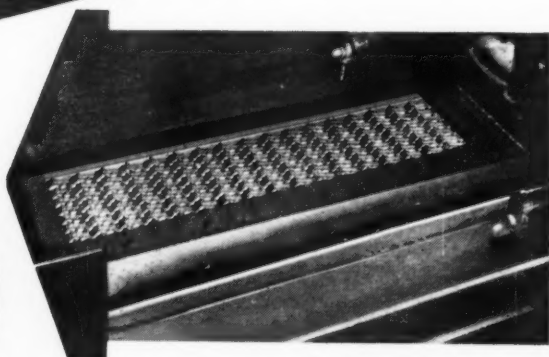


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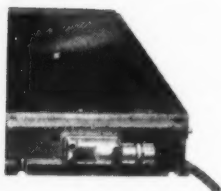
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Here's an interesting study of why many manufacturers are now using the new multiple pole Power-Grip Chuck to increase grinding production. Installation of a new Power-Grip Chuck provided 40% more holding area than was possible with the equipment of the same size formerly used. In the illustration above, the colored area of the chuck clearly shows this greater work holding area.

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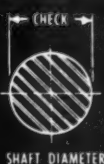
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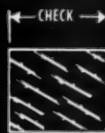


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we're going to do a good job in the shop. I'd appreciate it if you'd help cut the kidding down a bit, and I'm especially worried about violations of safety rules. You know it's my job to see we all live up to them, and I can't do it alone. I need the help of all you men. . ."

There it is, direct and simple. Unless your practical jokers are real troublemakers at heart (and very few are), this kind of frank approach will bring the desired results. Nothing elicits a

reasonable response quite as easily as a reasonable approach.

Mort was no troublemaker at heart, nor was he an opinionated, unreasonable fellow. He had been "told off" by supervisors on other jobs in the past, and Jack's understanding and frank attitude impressed him favorably. He was in his corner from then on, and his practical joking took a back seat to doing a good day's work. He wasn't forced into changing his ways; he was

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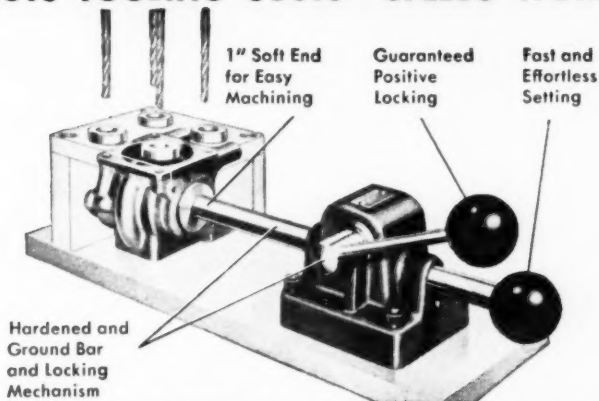
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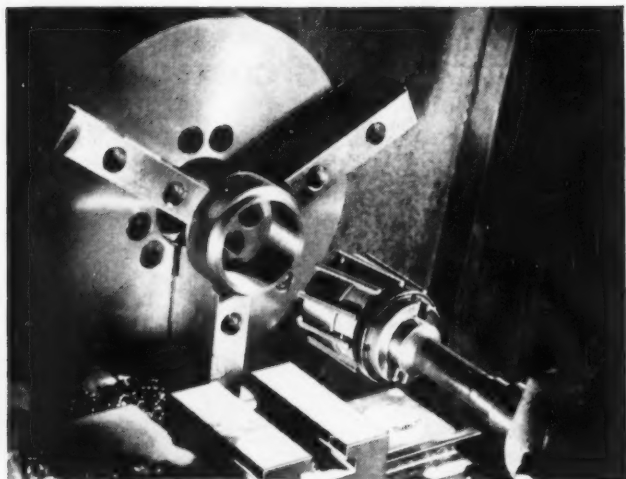
simply made to see the situation from the shop's point of view and therefore the necessity of eliminating the excessive cutting up. Mort became as enthusiastic and cooperative a worker as anyone in the shop.

One reason Jack was so successful is that he didn't wait until the situation had gone too far before setting out to do something about it. In fact, even before he talked to Mort, he made it a point to stay out of the "fun" and to make it clear that he wasn't going to let any-

one develop time-wasting habits. He was able to do this because he was constantly on his toes, always on the lookout for any signs that things were beginning to go wrong.

Practical jokers aren't very practical anywhere, especially not in a modern shop. Left to go their own ways, practical jokers can snafu a whole department. Keep an eye out for them, analyze an incipient bad situation early, and then do something about it.

**The End**

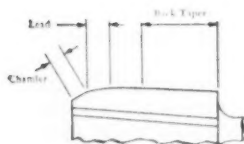


## **REAMER DESIGN** Controls **Accuracy, Finish and Production**

Barber-Colman Reamers produce finishes which were not previously considered possible on a standard production operation. Exceptional accuracy and tool life are also obtained on production runs as a result of the special features of Barber-Colman Reamers. Both solid-fluted and inverted-blade reamers are available.



Irregular flute spacing provides a smooth cutting action and fine finish, and helps to prevent the reamer from forming "welts". As a standard feature on all Barber-Colman Reamers, flutes or blades are spaced diametrically opposite each other so that they are easily checked with a micrometer.



The profile form on Barber-Colman Reamers is designed to produce the best possible finish and tool life. Following the chamfer, the lead is blended into a radius to produce exceptionally fine finishes. Through Barber-Colman cam-controlled sharpening, a sharp cutting edge, rather than a cylindrical land, is produced, resulting in a freer cutting action. With this control, successive reamers are sharpened with exactly the same profile form and relief angles to provide exact duplication of size, straightness and roundness.

**D E S I G N E R S   O F   S T A N D A R D   A N D   S P E C I A L**

### 20-25 micro-inch finish typical

On this job, 1000 pieces are reamed to a surface finish of 20-25 micro-inches before it is necessary to re-sharpen the reamer. The feed is 1.75" per minute at 280 rpm., requiring 30 seconds to ream the  $\frac{7}{8}$ " length of cut. Material is AISI C.1137 steel.

### 1500 pieces per sharpening

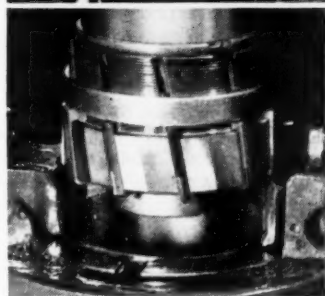
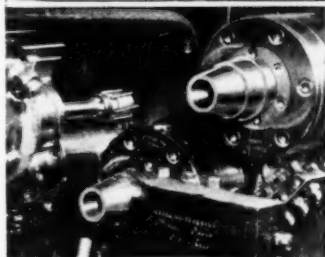
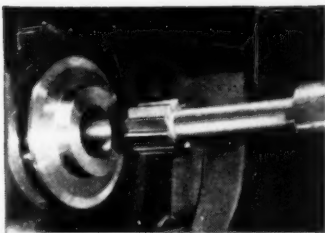
This carbide tipped inserted-blade reamer produces from 1100 to 1500 pieces per sharpening while maintaining the finish better than 60 rms. Tolerance on hole size is .002". Stock removal is .012" to .015" on the diameter, and the material is B1117 steel. Speed is 105 sfm, and the feed is .0088" per revolution. A Barber-Colman Reamer Sharpener reproduces the correct profile on the reamer blades with each sharpening.

### tool cost reduced from \$1.57 to \$1.32

These Barber-Colman Reamers are producing truck cylinder liners with accurate straight round holes free from welts or taper at a tool cost 15% less than previous records. Material is cast iron. Replaceable blades with carbide tips give long reamer life and cutting edges which stand up under continuous production. 6-5 more pieces per set of blades are now obtained, and tool cost per 100 liners has been reduced from \$1.57 to \$1.32.

If you are now choosing between accurate, quality-finish reamed holes — and low-cost production and tool maintenance — you can have both, using Barber-Colman Reamers. More flutes per cutting diameter, solidly backed cutting edges, and standard irregular flute spacing will give you tool room reaming quality under regular production conditions.

*Send specifications on hole sizing and finishing problems to Barber-Colman engineers. They will furnish reamers for your particular requirements to give you the desired quality consistently.*



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GENERAL OFFICES AND PLANT, 955 ROCK STREET, ROCKFORD, ILLINOIS

M E T A L   C U T T I N G   T O O L S   S I N C E   1 9 0 8

# Universal Pitch Circle Drilling Jig

By **Tom Brown**  
Consulting Tool Engineer

MANY SMALL firms engaged upon batch production of components are often confronted with the problem of deciding whether jiggling and tooling will prove economical for their work. There is no doubt that tooling will speed up the output of most jobs and the situation often arises where tools are essential in order to hold an awkward part or to meet accurate specifications. The indecision often suffered by most tool engineers is caused by the job which can be performed fairly rapidly by using standard equipment in the hands of skilled men or, alternatively, could be placed in charge of a low-skilled operator using a jig. Having accurate information about production and tooling costs will usually help the tool engineer to make a decision. Study of tooling costs will often bring to light the surprising fact that it is economical to tool for as low as 50 components if low skilled labor can be used.

Another way to obtain the advantages of special tooling while ensuring that the tools do not cause a financial loss

is to take a broad view when designing the tools. It is often possible for a tool designer to start with one fixed job in mind, for which he has to design a jig or fixture, and then to realize that his rough scheme could be modified to cater for a wide range of similar work. The modified scheme will often cost a little more than the original one, but, in the long run, will prove very economical. By careful design and a bit of imagination, an arrangement emerges eventually which is in the nature of a standard piece of equipment of wide use for both batch and single-piece production.

The jig forming the subject of this article arose out of the need for means of drilling-equally spaced holes around pitch circles in disc-shaped components. The jig was to be used by a small machine tool manufacturer whose products included ball race covers or end plates, special pipe flanges for hydraulic gear, and numerous other parts.

Specification of the jig required it to be capable of drilling 3, 4, 6, 8, or 12



equally spaced holes on pitch circles up to 4 in. diameter. The holes were to be clearance sizes for standard bolts so that the standards of accuracy in hole placing required of the jig were not extremely close. Low-skilled operators and standard drill presses were to be used.

To meet the specification for such a jig, the design called for some work-holding means which would centralize and clamp the component in one operation. Indexing equipment had to be provided to enable the work to be rotated through a set number of degrees to bring it to a new position under the drill. Some fool-proofing was required for the indexing gear. The provision of separate indexing plates for each number of holes was rejected; a minimum of detachable parts would ease the storage problem and would enable the jig to be brought into use more rapidly if there was no need to spend time setting the jig by fitting plates for indexing. Drill guiding had to be provided and slip bushings were used for this. Finally, some method of adjusting the pitch circle diameter upon which the holes were to be placed had to be evolved.

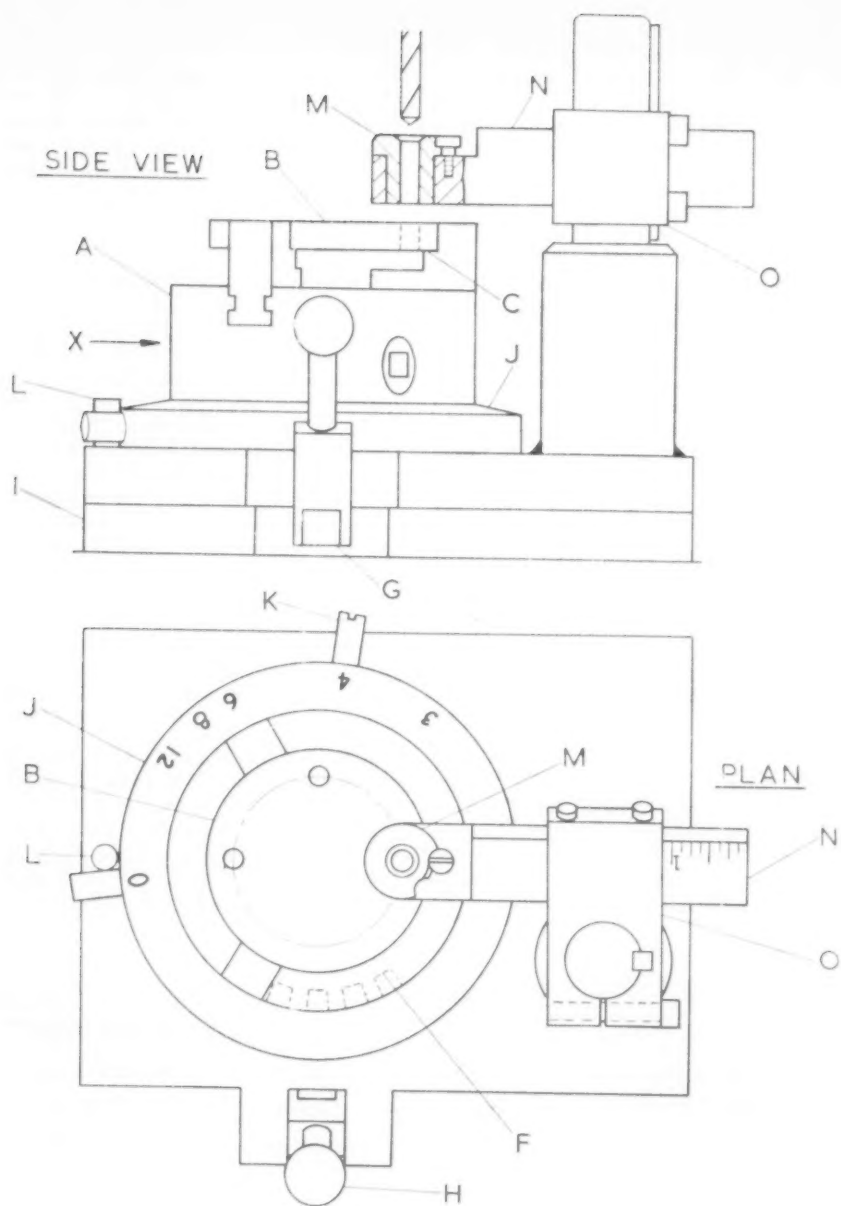
The final accepted design for the jig is shown in the illustration. The best work-holding means which would hold a wide range of diameters and center the circular pieces at the same time was a standard 4 in. 3-jaw self center-

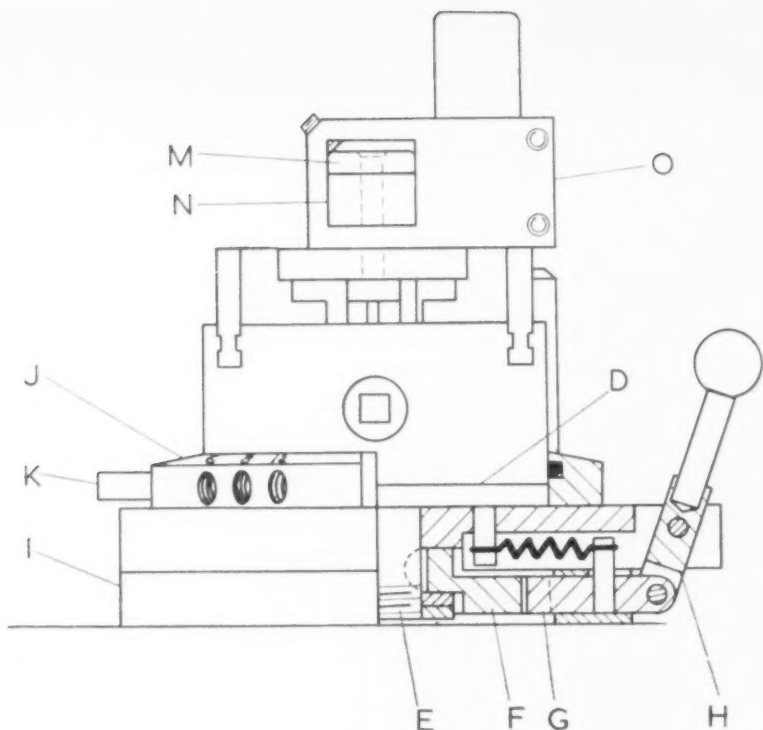
ing chuck **A**. It might be pointed out that the use of chucks in tool designs produces considerable increases in efficiency, in many cases. A chuck is a cheap work-holder when compared with the cost of producing an equivalent in the tool room. It will grip circular components, a typical example being shown at **B**, concentrically within a thousandth or two, over a fairly wide range of sizes.

Modified jaws are fitted to the chuck and comprised, originally, plain unmachined blanks when purchased. They were turned to provide steps of the shape shown and then hardened and ground. The gripping range of the jaws is from 2 to 4 in. diameter. A standard set of internal and external gripping jaws was purchased with the chuck and these can be used for gripping a wide range of components which cannot be held by means of the modified set shown in the drawing. Face **C** on the jaws is made as narrow as possible in order to be clear of drilled holes which are close to the periphery of a component and to allow the drill point to pass right through the hole in the part.

A back plate **D** serves to mount the chuck upon the base plate **E** of the fixture. Integral with the back plate is a downward projecting circular pin **E** (View X) which is a close fit in the hole machined through the base plate. The chuck and back plate can be swiv-

**Here is a drilling jig for drilling equally spaced holes around pitch circles in disc-shaped components. The jig is capable of drilling 3, 4, 6, 8 or 12 equally spaced holes on pitch circles up to 4 in. diameter. Low-skilled labor and standard drill presses are used for the job.**





VIEW X

elled upon this pin so that the work gripped in the chuck can be indexed into place under the drill.

Below the base plate and keyed to the pin **E** is the indexing plate **F**. This has 24 equally spaced wedge shaped notches machined in its periphery, the number 24 being divisible by any quantity of holes which will be required in the components to be drilled. View X shows in section the square section indexing plunger **G** which has a wedge-shaped end for engagement with the notches in the edge of the indexing plate. A tension spring urges the indexing plunger into engagement with the plate notches, its end loops

engaging with a stationary pin fixed in the base plate and a second pin fixed in the plunger. The plunger is guided in a square hole machined in a block which is secured to the under face of the base plate.

To withdraw the indexing plunger from the plate notch so that the chuck may be rotated to a new position, a handle **H** is provided. Movement of the handle to the left pulls the plunger in a right hand direction, clear of the indexing plate notch. The plunger must be held clear by means of the handle during indexing by using the right hand for holding back the pin and rotating the chuck with the left. Upon

releasing the handle, the plunger will be forced into engagement with the nearest notch on the edge of the indexing plate under the action of the spring.

All the indexing gear is housed below the base plate so that it cannot become fouled by swarf and chips from the drill. Additional protection is afforded to the indexing gear by enclosing the space under the base plate by means of side pieces of steel **I** which are welded in place all around the edge of the plate. The side pieces form narrow edge supports for the complete fixture so that sliding it over the drilling machine table will automatically disperse any particles of dirt upon which the jig may be standing.

With the indexing plate out of sight of the operator and the provision of 24 indexing notches, it would be easily possible for the operator to make a mistake of one notch or more when he had to drill, say, 3 holes at equal intervals around a component. Three holes require the work to be indexed through 8 notches and it would be difficult to see whether 7, 8, or 9 notches had been passed over. To avoid this happening, a setting ring **J** is provided.

Setting ring **J** surrounds the lowest part of the chuck body and is a stiff rotatable fit thereon, the stiffness being provided by a rubber O-ring fitting into an internal groove in the bore. On the outside diameter of the setting ring are six radial tapped holes and the positions of these holes are indicated, in the plan view, by the figures 3, 6, 8, etc., which are engraved on the sloping or bevelled surface. The screw driver slotted pin **K** can be inserted into any of the radial holes except for that marked with a zero. One pin stays in the zero hole all the time. As can be seen from the plan view, the pin **K** is in the hole marked 4, which number corresponds with the hole spacing in the component which is being drilled at the time.

The procedure for using the setting ring is as follows: In the plan view it can be seen that 3 holes out of the 4 required have been drilled. To index the chuck and work into position for the fourth hole, the indexing plunger is withdrawn by actuation of the knob provided. The chuck body is then rotated in a counter-clockwise direction carrying with it the setting ring and its projecting pins. The chuck is rotated until pin **K** makes contact with the upstanding pin **L** fixed into the fixture base plate. Release of the indexing plunger knob will ensure then that the correct notch in the indexing plate is engaged. Before drilling the hole, the operator rotates the setting ring in a clockwise direction so that it moves in relation to the chuck body, which is now held fast by the indexing plate. The ring is rotated until the zero pin makes contact with the fixed pin **L** when it will be back in the position shown in the plan view.



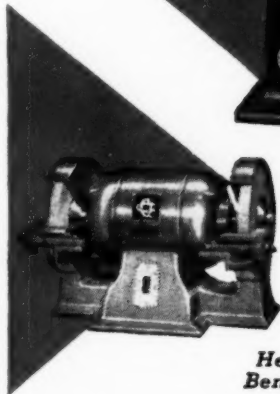
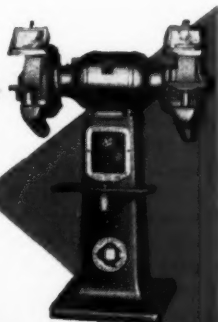
It will be apparent to anyone who has used a universal milling machine dividing head with division plates that the action of the setting ring on the jig is similar to that of the adjustable fingers used on a dividing head for selecting the correct number of holes in the division plate. On the drilling jig, indexing for 12 holes will require the indexing plunger to engage alternate holes in the indexing plate, by placing pin **K** into the setting ring hole marked 12, arcuate movement of the chuck will be limited by the pins in the ring to 2 divisions.

To control the pitch circle radius upon which the holes are drilled, means are provided for enabling this radius to be set in a simple manner. A slip bushing **M** of standard pattern is selected to suit the drill size and is inserted into a hole at the end of the arm **N**. This arm is of square section and is case-hardened and ground so that the changing of bushings does not wear the hole into which they fit. The arm is slidable horizontally within the block **O** and may be clamped thereto by a pair of headless set screws whose flat ends bear upon a diagonally placed flat machined along one corner. The upper surface of the arm is divided by means of engraved lines into fractions of an inch as is shown in the plan view. Facilities were available for engraving the arm but a cheap substitute for this could be provided by soft soldering a short length of standard rule in position, instead of going to the trouble and expense of engraving.

Settings for the pitch circle radius are obtained by reading of the graduations of the rule against the back surface of the block. From the plan view it can be seen that the pitch circle radius for which the arm is set is  $1\frac{1}{8}$  in. If the arm were pushed into the block until the rule end were flush with the back surface, the rule would, in effect, be set to zero position and

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the center line of the drill bushing would be aligned with the vertical center line of the chuck. Visual splitting of the rule graduation lines by the back face of the block enable pitch circles to be set to any accuracy of about two thousandths which is good enough for most pitch circle diameters having drilled clearance holes for bolts.

In the jig illustrated, it was thought that a higher standard of accuracy in pitch circle diameters than could be obtained by rule setting might be needed for some jobs. The precaution was therefore taken of ensuring that when the arm end was dead flush with the back face of the block, the drill bushing center line was placed precisely over the chuck center. When an accurate pitch circle setting was desired, a depth micrometer could be used for measuring the projection of the arm from the block.

To allow for different component

heights, the block carrying the arm can be adjusted vertically upon the cylindrical pillar **P**. The pillar has an accurate keyway running vertically to guide the block and hold it correctly at any position thereon. Locking of the block to the pillar is by means of two cap screws nipping together a saw-cut in the block.

The bottom face of the drill bushing must be clear of the component surface to permit insertion and removal of pieces for drilling but this has not been found a serious impairment of accuracy. The clearance between the bushing bottom and the component surface need not exceed  $\frac{1}{4}$  in. since the component can be tipped upward at its front end for removal from the jaws.

This jig has proved to be extremely valuable both for production and for general work. It has been found useful for single pieces since the simplicity of holding the job and the ease with which



**Reliant** "O" Ring  
**GROOVE GAGES**

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- ➔ Checks std. ranges  $\frac{1}{8}$  to  $\frac{1}{4}$  accurately and quickly.
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NORMALLY FOUND IN LARGER LATHES**

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Sturdy 16 ga. metal.  
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 x 6 1/4" deep. Drag  
 holes and handles at  
 both ends.

**J. L. LUCAS & SON, INC.**  
 Bridgeport 5, Conn.



it may be adjusted for various parts involves less time than would be required for marking out and center punching the hole positions. On small quantity production work, the jig has shown definite savings in time over former methods and has rendered obsolete a lot of miscellaneous plate-type drilling templates which were slow and laborious to use.

The End

**STANDARDIZE with LODDING**  
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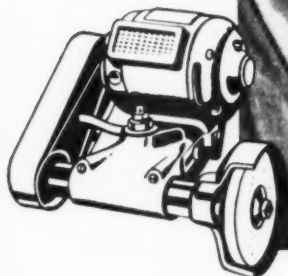
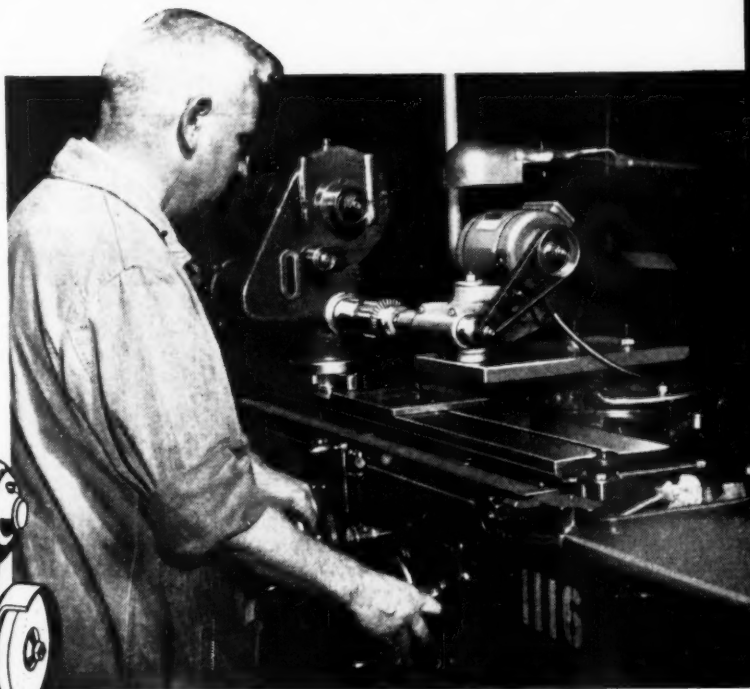
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Since 1927, this chuck manufacturer has used DUMORE precision grinders. Here is his report:

"Our Dumore No. 5 units operate 100 hrs. per week for the internal grinding of 3 open jaws for our  $\frac{1}{8}$ " to 1" plain bearing key type chucks. The material is 60 Rockwell C hardness alloy steel and we remove .005".

"The Dumores are well adapted to this fine

work and produce a glass-like finish. Their sturdy power transmission, solid spindle shaft, self-oiling features, air-cooled motor and variable speeds make them exceptionally well suited for this work. They operate continuously, with little effort and very low maintenance cost."



If you are seeking to improve your internal grinding operations, investigate the advantages of Dumore grinders. Get details from your industrial distributor or write:

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## Case Histories Calculate the "Dollar Wisdom" of Using Portable Air Tools

CURSORY examinations through the plant and the actual testing of "opportunity areas" define the benefits to be gained from either replacing hand tools with portable ones or changing one portable tool for another.

The next step is to translate the data gathered into dollars and cents values to prove that a changeover is justified economically.

To illustrate this "financial" report, let us set up a case where a plant has an air supply and additional air tools seem to be warranted. The figures used in this case will be the average of the data gathered in plant studies.

The report supporting the value of a method changeover should include:

- A—A finite statement of production benefit.
- B—An accounting of costs which may be charged to the tool.
- C—Correlation of above figures arriving at a "time-to-repay" estimate.

**Production Benefit:** This figure is arrived at readily by translating test data into a simple statement of production savings.

An air-operated tool reduces grinding time by 40 per cent. The present time is 10 minutes; with the proposed tool, 6 minutes. At present  $60/10 = 6$  pieces are turned out per hour; with the proposed tool,  $60/6 = 10$  pieces would be turned out per hour.

The ratio of  $10/6 = 1.67$ . In other words, production could be increased 67 per cent by the changeover.

**Tool Charges:** There are three principal charges to be made to the tool: (a) original cost; (b) labor; and (c) overhead.

The original cost is readily fixed since it is the price paid for the tool. In this case, say \$120.

Charging labor to the proposed tool requires care. Too often there is a tendency to "rough" a calculation by stating that if a man works 2000 hours a

year and his rate is \$1.75 per hour, the labor charge to the tool should be  $\$1.75 \times 2000 = \$3500$  per year, or approximately \$70 per week. There are only a few cases where a man's output is dependent all the time on his portable tool equipment. The new equipment is not going to save any time on non-productive activities, nor is it going to save time for other operations the worker does which do not require portable tools.

Actually, the average portable tool is used but 50 to 60 per cent of the time. In some operations the figure may drop to 20 or 30 per cent. Particular care should be taken during the testing investigation to establish accurate time usage, because a just savings analysis depends on this figure.

Let us say the grinder in the illustrative case is used 50 per cent of the time.

The weekly labor charge made to the tool, therefore, is  $\$1.75 \times 40 \times 0.50 = \$35$  per week, not \$70.

Another factor requiring care is overhead.

Overhead is high in the American business picture today. The cost of replacing of equipment is tending to increase this burden, so overheads of 100 per cent or more on direct labor are quite usual. Moreover, within the limitations of raw material supplies, all companies today are in a position in which marginal or extra business is very profitable to them if they have the time to produce.

Actually, therefore, if savings are



**Deburring of a sheet metal aircraft part.**

too cumbersome to take to a machine and so formerly done by hand, is now done by using a standard pneumatic grinder with a gear box added so that speeds from 0 to 250 revolutions per minute can be had with complete control to prevent chatter. This changeover jumped the production in the deburring section and raised worker morale by cutting down fatigue. The tool paid for itself in six days.

**There is a formula for figuring savings inherent in the use of portable air tools. You can determine quickly and accurately whether it will pay you to substitute portable air tools for hand operations. Case histories of various manufacturers point out substantial savings on a variety of operations.**



This pneumatic polisher for pierced holes of a water manifold replaced the manual method. Operation time was reduced from 11 minutes to 5 seconds. This tool paid for itself in less than one day.

possible by installing new portable equipment, relative variations in the amount of direct labor rates, or overhead rates, will make little difference in the soundness of the arguments for portable tool equipment.

Using our labor figure of \$1.75 per hour, a conservative charge for overhead will bring the figure to about \$3.20 per hour.

**Correlating Savings and Costs:** With savings and costs data tabulated, a simple formula will tell approximately how long it will take a tool to pay for itself. The formula is:

$$\frac{\text{Cost of New Tool}}{\text{Actual Savings/Work}} = \text{Weeks to Repay Cost}$$

The formula may be used in one of two ways:

**Overall Savings Method:** Here the savings are determined as follows: Labor and overhead per hour x the hours worked per week x the savings in percentage of time. In the illustrative case, this would come to \$3.20 x 40 hours per week x 0.40 (actual reduction in time required for grinding) = \$51.20 per week savings.

**Specific Savings Method:** Savings here are determined as follows: Labor and overhead per hour x hours per week x factor in use. In the illustrative case, this would come to \$3.20 per hour x 40 hours per week x 0.67 (per cent increase in production x 0.50 (per cent time in use) = \$40.47.

Either method may be used, although the second is somewhat more exact and probably will give the fairer judgment.

Using the tool cost figure of \$120 and inserting into the formula we find:

#### Method 1

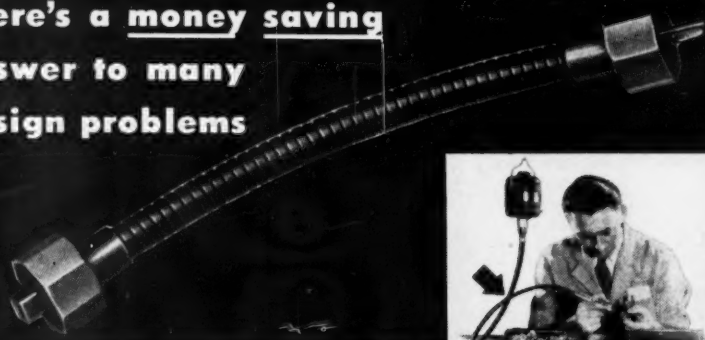
$$\frac{\text{Cost}}{\text{Savings/Week}} = \frac{120}{51.20} = 2.3 \text{ weeks to repay}$$

#### Method 2

$$\frac{\text{Cost}}{\text{Savings/Week}} = \frac{120}{40.47} = 2.9 \text{ weeks to repay}$$

Under practical conditions, it will be found that wherever hand tools are replaced by power tools, usually of a small size, the time of repayment is very short. It may, under exceptional conditions, reach as low a figure as 10

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answer to many  
design problems**



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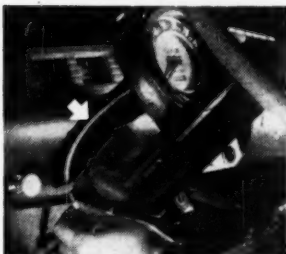


### **HERE'S VITAL INFORMATION FOR ECONOMY-MINDED DESIGNERS**

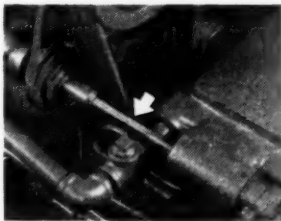
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**Instant positioning and loading of crankshafts** for milling of keyways is accomplished with the air-operated clamping fixture shown. One operator is thus able to attend two machines. The "gadget" paid for itself in one-half day.

or 15 working days in the case of screw-driving or nutrunning operations. In the case of large specialized tools where savings are not great, it may take as long as a year to pay for the tool, although it may be necessary to buy some type of tool to get the job done. Attention is directed, however, to the variation in time of repayment as affected by the price of the tool itself.

Once a number of variations have been figured, it becomes quite practicable to set up a shop policy: first, that portable tool equipment in individual cases will be bought only when the earnings will pay for the machine in a given period of time; and second, that additional or replacement installations, including power supply unit, must be figured by engineering as well as factory. Consideration of facts will direct attention of the operating organization to the possibilities of savings by improving portable tool operations.

Before leaving the important ideas of investigating production methods for opportunities to improve, and also of justifying changeover, added incentive might be gained from reviewing quickly what some metalworkers have found by scouting around.

**Steel Beam Fabricator:** A structural steel company fabricating large steel beams (60' x 5') required three men working two days to complete the fitting up operation of one unit. Assembly consisted of bolting parts by hand, using a bolt in every eighth hole. The same men using an air-powered impactor completed a unit in one hour. The tool paid for itself in four hours of use. Here's how they figured:

To complete one unit required:

3 men, in two days (by hand) = 48 hours

3 men, in one hour (air tool) = 3 hours



# 120% INCREASE IN PRODUCTION

With Less Manpower



## D.P.S. Motorized HOPPER UNIT

PICKS 'EM UP & LAYS  
'EM DOWN IN EXACTLY  
THE RIGHT POSITION

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To Your  
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Send us your feeding problem . . . Tell us where you want it . . . How fast you want it . . . and in what position you want it . . . **AND WE WILL PUT IT THERE FOR YOU.**

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**Furnace downtime was reduced 62½% by using an air-operated tool for removing and applying roll bearing nuts and other parts during the scheduled teardown of a large mill.** The original hand method took 4 hours; the air-operated tool method, 1½ hours. Down time savings amounted to \$16.65 per minute. The tool paid for itself in 42 minutes and showed a profit of \$800 on the operation.

**Production was increased 80 per cent by using air-powered screw drivers on a manufacturing assembly line.** The tools cost \$3,680; the savings in wages amounted to \$368 a day; the tools paid for themselves in 10 days.



**Air tools save 45 man hours, equal at \$1.50 to \$67.50.** Cost of the tools totaled \$259 ÷ \$67.50 = 3.8 hours to repay.

**Tractor Repair Shop:** A tractor shop formerly removed and replaced by hand

the valve guides in cylinder heads. A lightweight, high-power air hammer reduced time by 50 per cent. In addition, breakage, which had been common, was eliminated. The investment of \$112 paid for itself in 19 working days.

**Changeover to air-operated tools** in this automotive spring service shop resulted in a 30 per cent production increase. Air tools cost \$469 and paid for themselves in 26 days.

**Pressure Cooker Manufacturer:** Formerly, seven  $\frac{1}{8}$ -inch holes in cover lugs were drilled one at a time. By mounting seven small air-operated drills in a fixture, the time cycle was reduced 86 per cent. The equipment, costing \$364, paid for itself in 6 days.

Again, the method of figuring:

**Old Method**—7 hours operator's time cost \$8.75

**New Method**—1 hour of time costing \$1.25

**Savings per hour of use**—\$7.50

**Cost of tools**—\$364 : 7.50 = 48.5 hours to repay.

**Turbine Manufacturer:** Turbine wheel blade covers were formerly hand-riveted. The work was so fatiguing that two gangs of men were required. The plant methods group recommended pur-



**A large fabricator of metal products** installed labor-aiding, time-saving, air-powered screw drivers costing \$1240. Because of the ease of operation, increased production and decreased labor cost, the manufacturer saved \$15,500 the first year.





**A structural steel company fabricating** large steel beams (60' x 5') required three men working two days to complete the fitting-up operation of one unit. Parts were bolted by hand, using one bolt every eighth hole. The same men using an air-powered impact tool completed the same job in one hour. Compressed air saved 45 man-hours at the approximate rate of \$1.50 per hour which equaled \$67.50 saved on each unit. The cost of the air power equipment, \$259, divided by \$67.50, equaled 3.8 hours in which it paid for itself.

chase of air-operated riveters. The output per man increased three times; the equipment paid for itself in eight days with an annual savings of \$12,000.

**Automobile Manufacturer:** A reversible air motor was installed to operate a jig chuck on a machining operation. Production increased from 32 to 37 units per hour. In addition, the air motor eliminated 90 per cent of operator fatigue. Uniform chuck tightness was another benefit. Six units, costing \$3000, were installed and paid for themselves in 60 days.

**Metal Furniture Manufacturer:** This manufacturer had the problem of driving rivets to a predetermined grip to permit a hinging action. An air buck riveter costing \$106 was installed, paying for itself in 12 days.

**Heavy-Machinery Manufacturer:** The job here was to clean out fins, sand and scale from  $\frac{1}{2}$ ,  $\frac{3}{8}$  and  $\frac{3}{4}$  inch holes in

bearing plate castings. Previously the castings had to be carted to drill presses where reaming was done. A change to portable air tools was recommended. Using the air tool, the pieces were cleaned on the floor, eliminating fixtures and all extra handling. Savings were on the order of 20 to 1. The tools paid for themselves in 8 days.

**Printing Machinery Manufacturer:** An eastern firm manufacturing printing machinery nailed down its flat car assemblies by hand. The company purchased an air hammer with a nail set. A test showed that one man operating the air hammer could nail down the assembly in one-half hour as opposed to 3 hours by hand. The deciding factor in the purchase of the tool was the proof that the tool costing \$150 would pay for itself on only 5 shipments.

**Vise Manufacturer:** A fabrication job involved the attachment of a large

# STANDARD CARBIDE TOOLS

by **SUPER**

**CARBIDE END MILLS**



**CARBIDE TWIST DRILLS**



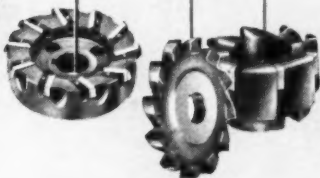
**CARBIDE REAMERS**



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SPECIAL TOOLS**



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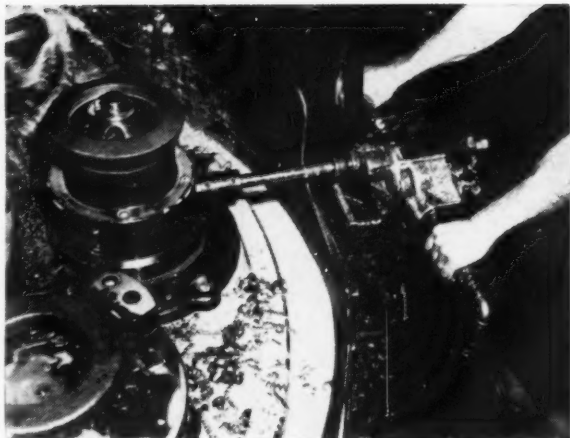


The Super line of carbide tools features aggressive and up-to-the-minute thinking in cutting tool design. More than 50 items in a complete range of sizes are carried in stock in warehouses conveniently located in New York, Detroit, Chicago and Los Angeles.

**Super**  
**TOOL COMPANY**

21650 Hoover Road, Detroit 13, Michigan  
also 5210 San Fernando Rd., Glendale 3, California

Production was increased and cost decreased with the installation of a reversible air motor to operate a jig chuck on a machining operation, in automobile manufacture. Production was increased from 32 to 37 units per hour. In addition, the air motor eliminated 80 to 90 per cent of operator fatigue. Uniform tightness in the chuck and greater accuracy are also added benefits. The six units installed cost \$3000 and paid for themselves with these savings in 60 days.



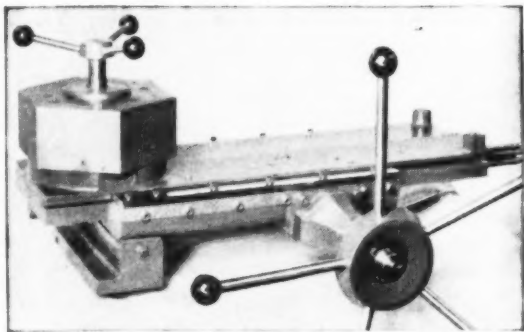
spring to a vise assembly by means of two  $\frac{3}{8}$  inch slotted screws. Using hand screwdrivers, workers completed 260 assemblies per day. Two air-screwdrivers were put on the job and production increased to 400 assemblies per

day. The tools paid for themselves in 64 days.

From these and many similar instances, it becomes evident that it pays to investigate changeover opportunities.

**The End**

### LYNN Turret Series F-BT3—for Lathe Swing 15" to 26"



Head .....9 $\frac{1}{2}$ "  
Tool Hole .....1 $\frac{1}{2}$ " to 2"  
Working Travel .....10 $\frac{1}{2}$ "  
Over-all Length .....35"  
Swings 6" Box Tools  
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Self-Indexing for Fast Production

Easily Adjustable for Alignment and Wear

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**Turrets available for smaller Lathes**

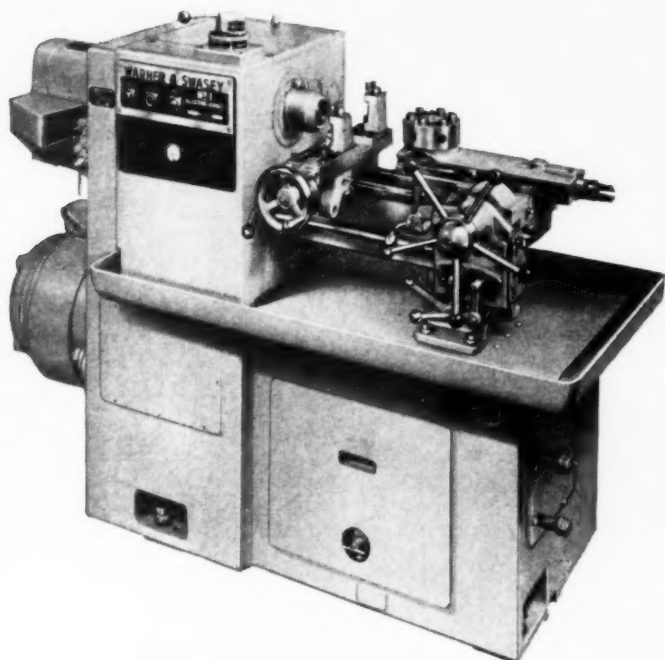
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**1121 South Seventh St.**

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## New Warner & Swasey Turret Lathe wins fast acceptance!

SINCE its introduction in 1950, the Warner & Swasey No. 1 E-C has lived up to the reputation for accuracy and dependability already set by its "big brothers" in the Warner & Swasey line. But, let *users* tell you how this new  $\frac{1}{4}$ " capacity machine is performing:

"... a great deal more flexible than previous machines of its size."

"... more rigid."

"... power feed to turret a decided advantage."

"... delighted with its speed range and accuracy."

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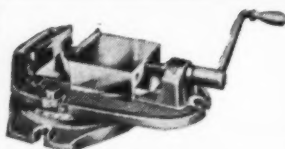


And the reports continue to come in from all types of metalworking plants across the country. Such plants as Dumore Company of Racine, Allmetal Screw Products of New York City, Bahnson Company of Winston-Salem, Wisconsin Motor Corp. of Milwaukee, Kearfott Manufacturing of Newark and many others tell us the 1 E-C is outperforming any small capacity turret

lathe they've ever had. You'll find it profitable to investigate the Warner & Swasey No. 1 E-C Turret Lathe, so have your Warner & Swasey Field Engineer show you how it can improve *your* small diameter bar operations.

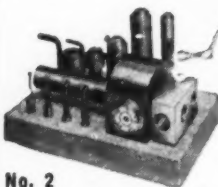
YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY





#### MILLING MACHINE VISE

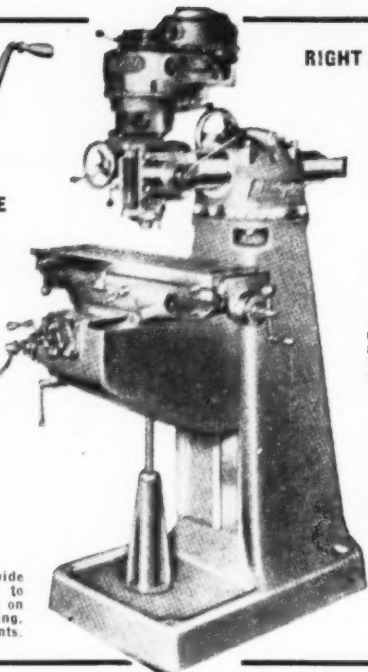
An improved vise that provides greater gripping power, is streamlined for appearance and incorporates a coolant trough. A large diameter screw assures rigid holding. Made in two sizes: 5"x3½" and 6"x5" jaw openings.



#### No. 2

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(Above) Heavy Duty Attachment for milling and drilling at right angles. Fits both Master and 1 HP Bridgeport Heads.

(Right) Light Duty Attachment designed for right angle milling and drilling narrow deep molds and cavities.



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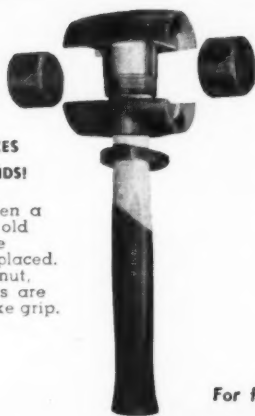
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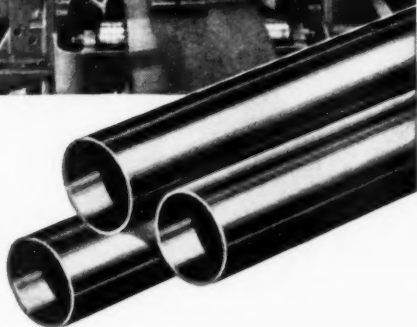
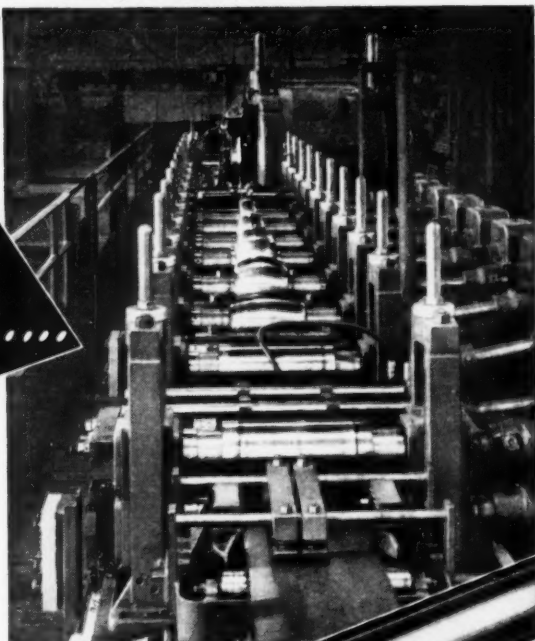
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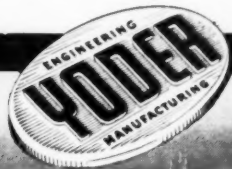


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# The Right Rivet For The Right Job Can Save You Time and Money . . . part 2

## Rollset or Anvil Tips

IN ADDITION to the jaws, drivers, tools and riveting machines discussed last month, there are also rollsets and anvil tips which are needed for satisfactory riveting performance. This classification is extremely broad due to the many applications and rivet types. For the sake of clarity, we will refer to this group as rollsets for the tubular rivets and anvil tips for the solid sets.

Rollsets usually consist of four components: plunger, anvil, nut and spring. These parts have a definite relationship to each other and to the rivet. The outer shape and size are either of a standard nature or altered to suit the limits of the application. Inasmuch as the rollset is one of the most important factors in obtaining a perfect riveting job, it will be of benefit to explain in detail the construction and working of this tool.

As previously discussed, the rivet is held by the jaw until the driver descends. At the point where the jaw stops, the rivet shank protrudes through and is centered or picked up by the spring-loaded plunger. The plunger recedes in the anvil until it is stopped

By **Robert M. Gordon**

The Milford Rivet and Machine Co., Milford, Conn.

by the nut. At this point a continuous form is produced by the form on the plunger blending with the form in the face of the anvil barrel. The rivet flares out in this form, continuing until the portion of shank allowed for the clinch has been rolled or set. The anvil and plunger forms must be accurately cut or hobbled and finished to a high polish. The form on the plunger is normally set from .003" to .005" above the form in the barrel. This allows the rivet to pass over the opening formed by the fit of the plunger barrel. The anvil may be somewhat "bellmouthed" from heat treating and finishing; also, the plunger tends to "sink" somewhat after normal usage. If either of these conditions oc-



#### Synopsis of part 1, April, 1953

Principal types of rivets are: extruded, drilled, bifurcated, and compression, and special. Types of rivets are important in planning for a riveting operation. Check with manufacturer for proper selection.

Rivets are usually hopper fed to the machine. During subsequent riveting operation it is important that the proper tools be used in the setting operation. Before the tools are selected we must know what type of clinch, or set, is required. This will have a bearing on the tools. Clinch varies; depending on the type of rivet selected.

The driver and jaws are parts of the riveting machine which affect the final riveting operation. Function of each must be understood for good riveting practice.

While part 1 deals primarily with types, methods, tools and fundamental aspects of good riveting practice it is worthwhile to review such information for future riveting efficiency.

curs to a marked extent, the rollset will not satisfactorily upset the rivet.

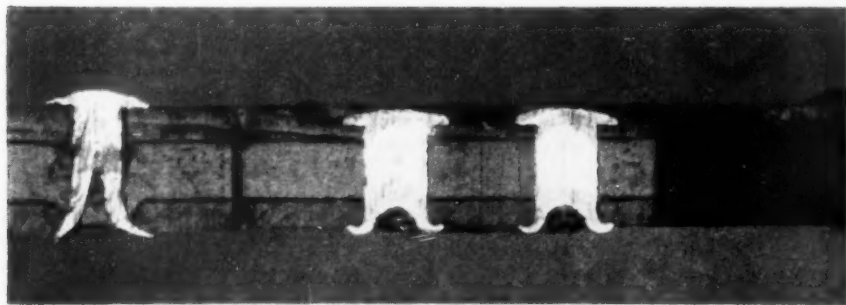
As mentioned, the forms are accurately cut or hobbled. There is a definite set of forms for the drilled rivet and a definite set for the extruded rivet. In most instances these forms cannot be

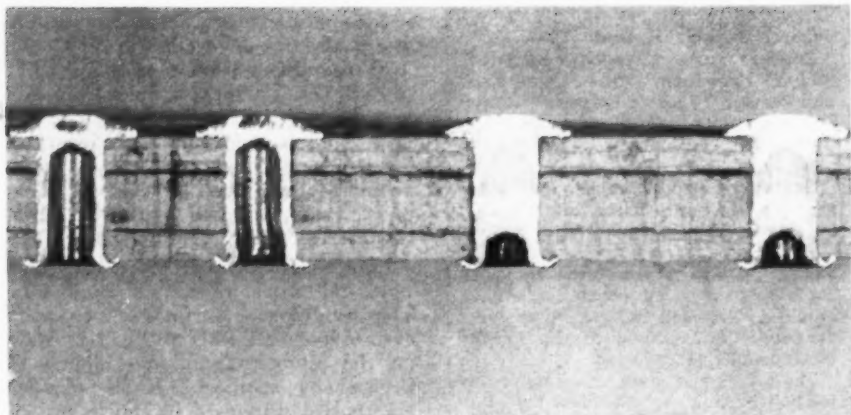
used interchangeably. The drilled rivet, due to the parallel walls formed by the drill, requires a portion of the plunger form to act as a support during the setting operation. This type of plunger is not required for the extruded rivet inasmuch as the walls of the extruded hole are somewhat tapered and afford the necessary strength to allow the rivet to start the curling or setting operation.

Plunger diameters are normally a few thousandths over rivet shank diameters. This condition again favors the setting of the rivet, allowing the roll to start on the plunger form and helping to bridge any opening between plunger and barrel. Plungers for rivets up to one-eighth inch in diameter start at an allowance of .002" up to .005". For rivets up to five-sixteenths inch in diameter, a plunger diameter from .007" up to .010" can be used.

The rollsets are designed to clinch a predetermined portion of the rivet shank. It generally holds true that an allowance of 70% of the shank diameter added to the compressed material thickness will produce the required rivet length. When the correct clinch allowance has been determined, the rivet should roll set, giving a full round set without excessive shank distortion. The

**At left is another sawed rivet** in which the broaching has produced stronger prongs. Center and right show extruded semitubular rivets which are even stronger than drilled rivets. They provide full shear and sturdy clinch and are used for assemblies with holes drilled or punched prior to riveting.





**Again for facility in cross-sectioning,** these deep (left) and shallow (right) drilled tubular rivets were driven into wood. Deep drilled are full tubular rivets. Shallow drilled are semitubular. The former are best for piercing soft materials like fabrics, plastics, wood and leather. Note that the shallow drilled cavity is only of sufficient depth to provide clinching or setting, best for fastening materials where hole has been punched prior to setting.

tubular portion of the rivet should be absorbed in the clinch leaving a solid shank through the assembly, affording maximum shear strength.

If the rivet is too long, there is danger of "bottoming" the solid portion on the plunger pin. This means that the pin is absorbing excessive setting shock and, as a result, will tend to "sink" below the anvil form.

Oftentimes it is necessary to sacrifice tool life to produce an extremely tight joint, where the rivet has not only to clinch, but also swell throughout its entire length, locking tightly in the assembly. This can only be obtained in the relatively short lengths of rivets inasmuch as the long lengths will only buckle.

In all cases, rivet length and protrusion for clinch are extremely important and, unless correctly determined, will result in tool failure or a poorly riveted joint.

Inasmuch as the plunger diameter is

larger than rivet shank diameter, it is necessary to drill or pierce the work to be riveted, with a hole size suitable for the standard plunger diameters. In some instances this is difficult to obtain due to several factors. Frequently dies, molds and work are completed prior to obtaining the necessary rivets and riveting equipment and, although a standard rivet can be utilized, it is necessary to incorporate an undersize plunger pin.

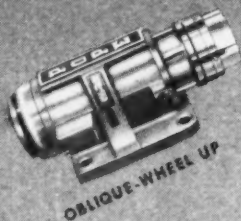
Another common difficulty is the tendency of softer materials to close in after drilling or piercing, again requiring the use of undersize plunger pins.

In all instances it is good practice to incorporate hole sizes which will allow the use of standard plunger diameters. This will provide maximum tool life and eliminate the tendency of the rivet to swell as it starts to clinch, then locking in the assembly.

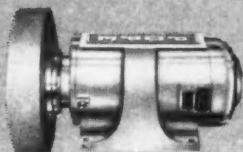
When the use of undersize pins results in the locking of the rivet, the

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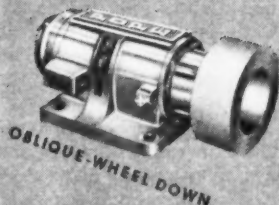
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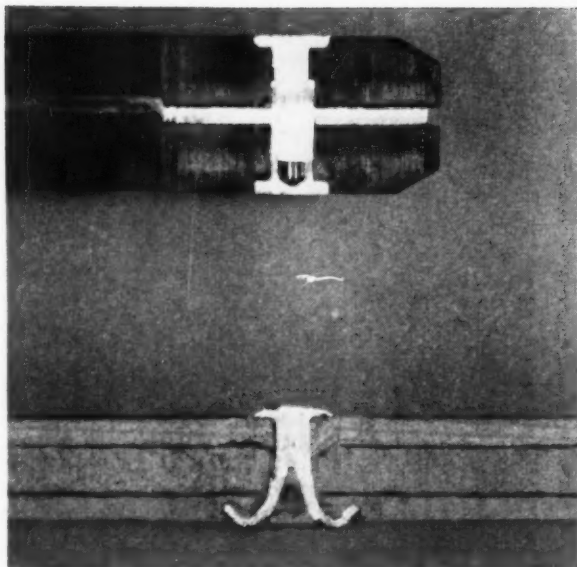
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**Cut-apart rivets were sawed to show position in the "work."** Top specimen shows compression rivet flush-countersunk in and joining two plastic handle sections of knife and holding blade strongly in position. The sawed or bifurcated rivet (below) was driven into pieces of wood to facilitate cutting apart. Its prongs pierced the work, securely joining the three sections and the prongs, free of distortion, were turned under to effect a smooth surface and strong joint.



trouble can sometimes be eliminated by the use of pressure pads. These pads are formed in several ways. A piece of dense rubber can be placed around the rollset, or a die spring can be located in the same manner. The use of either of these devices tends to hold the work above the rollset form, allowing the rivet to make the assembly and then upset. Often, when an assembly is made up of a series of components, rollsets can be constructed utilizing a spring-loaded collar which is then an integral part of the rollset.

For standard applications, the plunger protrusion is equivalent to length of rivet; however, where the assembly is sprung or to be compressed, longer plungers are required. In all cases, it is best to have the pin protrude through, in order to pick up and help center the rivet, leading it correctly through the work.

A further classification of the setting tools we term the "anvil tips." These tools are equally as important and varied as the rollsets; however, not as

complicated inasmuch as they are usually in the form of a solid set.

Anvil tips are used with either bifurcated or deep drilled rivets. When used in conjunction with the bifurcated rivets, the form is cut or hobbled to properly clinch the tips of the rivet shank after the rivet has pierced the work.

The anvil tip for deep drilled rivets is usually formed as a rosette or star and as previously mentioned, accurately cuts the rivet shank in equal segments. These tips are also used in combination with washers. It is also common to find a plunger type star set, having a star cut on the plunger tip, used with the deep drilled rivet. This tool is used where a portion of the work is pierced blind and the other component is located by means of the proper size hole and plunger.

In figuring the clinch allowance for the bifurcated or deep drilled rivet, it is standard practice to add 100% of shank diameter to the compressed assembly thickness. Due to the fact that



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these rivets are most commonly used for piercing in necessarily compressible work, it is best to determine the rivet length by an actual test.

Anvil tips are often ringed for the location of a washer, or in the case of the cap, an impression is formed to locate and support the cap as the rivet is clinched.

### Applications

Designs requiring rivets should be

required. Keeping in mind the previously described riveting cycle, it will be noted that the jaws must lower the rivet to the work. Therefore, interference around the rivet heads should be kept to a minimum. Right angle or channel formed pieces should allow for clearance of the jaws, bearing in mind that the two jaw halves must open to allow the rivet head to pass through. It is difficult to rivet into cupped or drawn shells when there is not enough



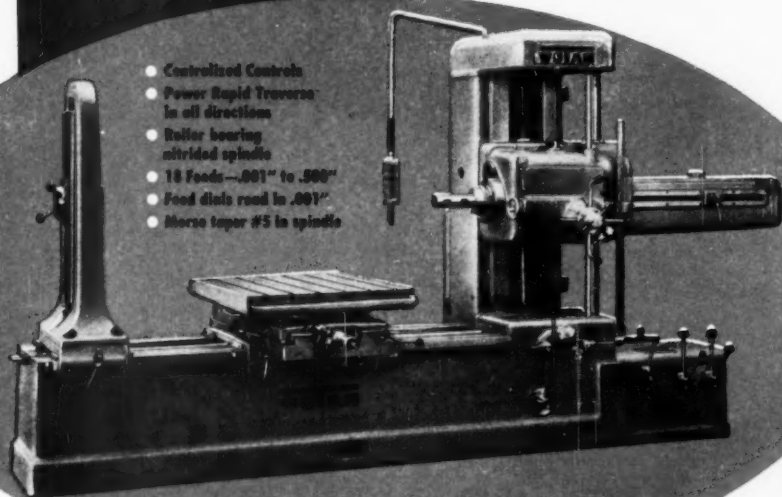
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room for the jaws to lower. Formations of this type are often a problem to load on the riveting machines.

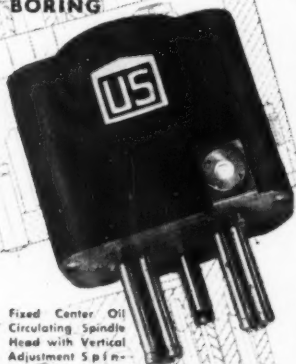
Adequate clearance should be allowed around the rivet clinch, so as to utilize tools of maximum strength. There are definite limitations as to the sizes of rollsets depending on the rivet involved and, if insufficient material is provided around the setting form, due to design limitations, the tool will quickly chip and crack at this point.

Rollsets and anvils are usually mounted in a cast bracket or machined steel arm and raised or lowered by means of an adjusting screw. When examining an assembly it is necessary to keep in mind the required clearances for the rivet clinch and the setting tools and holders. There have been many ingenious devices designed to reach into limited spaces where rivets are required. However, it is best to avoid small fragile tools which, although they

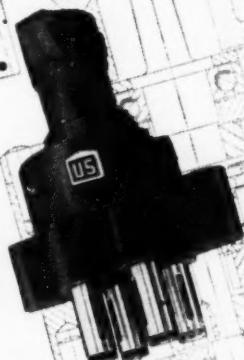
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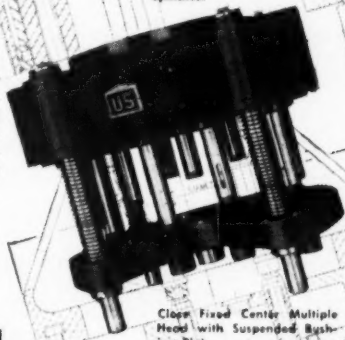


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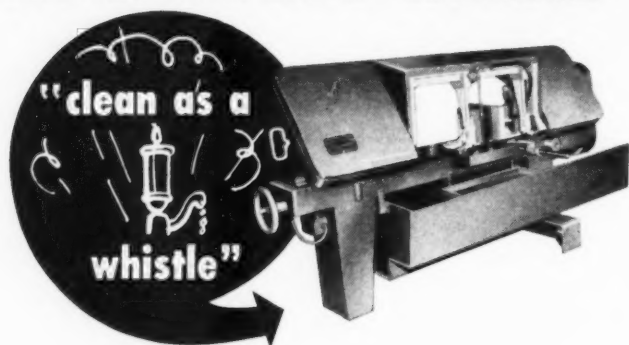
are cleverly designed, are also expensive and vulnerable as production tools. The rollset pins should have full protrusion through the work to pick up the rivet. The anvil body should be long enough to absorb the protrusion with proper spring support and plunger bearing. The holder for the rollset should be as strong as possible to keep breakage and wear to a minimum.

There are several common rivet set-

ting difficulties that can be recognized by an examination of the riveted joint.

When the rivet heads are marked or cut at four points around the edge, the driver is usually undersize to the point where the four corners formed by the open jaw are cutting the head. This can be eliminated by increasing driver diameter or stoning the corners of the jaws. On aluminum rivets it is often necessary to relieve the tension on the

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jaw springs, allowing the rivet to pass through without being cut.

Often a rivet will show a distinct ring on the head. This is due to the form in the driver not conforming to head radius. If a flat is produced the radius of the driver is too large and should be recut to suit.

The rivet clinch or set is the most important consideration and failure at this point is more critical than the aforementioned difficulties.

When the rivet is correctly figured to suit the application, it should protrude through the compressed assembly to an amount generally equivalent to approximately 70% of shank diameter. This point should be carefully checked before grinding or altering the rollsets.

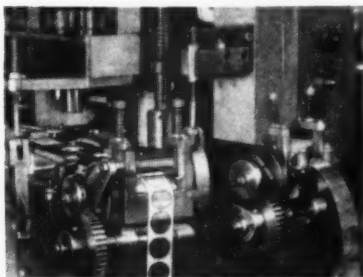
If the rivet is not getting through the work, it may be due to several conditions. First, the hole size in the work should be checked to see if the rivet is swelling at the start of the clinch and

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then locking in the work. Usually, if this condition exists, the head will remain slightly above the work. This condition can be most easily checked if the assembly is ground in half through the rivet, for, although the head may be flush with the work, the shank may be compressing and bulging throughout its length. If the hole size is correct and the rollset form is in good condition, it will probably be necessary to provide a pressure pad in the form of a rubber

ring or spring located around the rollset. These pads are most commonly used with soft rivets such as aluminum and silver.

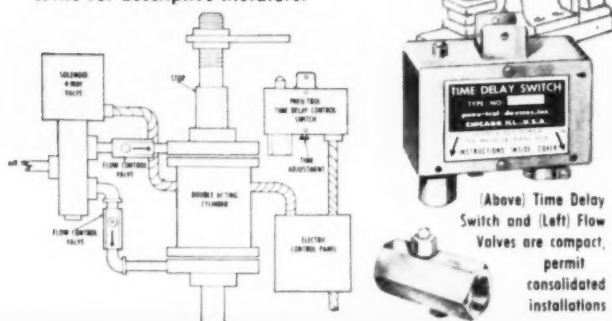
If the rollset is suspected of having failed, it should be removed and disassembled and examined as follows:

First, check for "sinking" of the form in the anvil barrel. This form tends to cave in after extended usage and once it has been destroyed the anvil is beyond salvage. The tool should also be

## Get MORE EFFICIENCY... INCREASED PRODUCTION from Air Operated Machines

**Pneu-Trol Flow Valves and Time Delay Switches** give air operated presses, fixtures and machines three advantages: (1) safe power stroke speed for both operator and workpiece, (2) power stroke timed at work position to permit air pressure build-up to proper work maximum and (3) fast return stroke. Ideal for arbor, drill and punch press work, burnishing, spinning, metal cutting, etc. Diagram below illustrates a typical Flow Valve, Time Switch setup.

Write for descriptive literature.



(Above) Time Delay Switch and (Left) Flow Valves are compact, permit consolidated installations

**Pneu-Trol Devices, Inc.**  
1440 N. Keating Ave., Chicago 51, Ill.

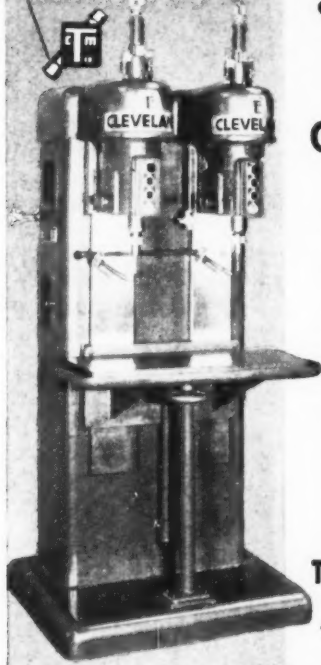
examined for a "bell mouth" condition produced by wear. If this exists to a marked extent, tiny circular slivers of the rivet material will be found around the tool holder. This failure will also throw a sharp ring around the distorted end of the rivet shank protruding through the work.

Secondly, the plunger pin should be examined for a breakdown of the form end caused by excessive wear. The pin should also be checked for a "mush-

rooming" condition where it bottoms on the nut. This will allow the plunger to depress below the form in the anvil allowing the rivet to lock and prevent forming.

Riveting equipment ranges in size depending on the capacity of equipment. Assemblies requiring small rivets must be designed so that the riveted points are readily accessible to the tools and in keeping with the throat depth and clearances of available equipment. This

*Another Cleveland Design  
to Speed Production!*



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The Cleveland Model E0 Duplex Lead Screw Tapping Machine does small hole tapping with a speed and precision equal to many larger machines! With separately operated spindles set-up and change-over time is eliminated on many jobs with a wider range of work made possible. Multiple heads for tapping groups of holes may also be used.

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*A Subsidiary of  
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**CANTON 6, OHIO**

*For Better Tapping -- Faster!*

# **CLEVELAND**

**tapping machines**

lead

screw



also holds true for the larger rivets which in turn will require larger machines and more rugged construction, again affecting the clearances to be allowed.

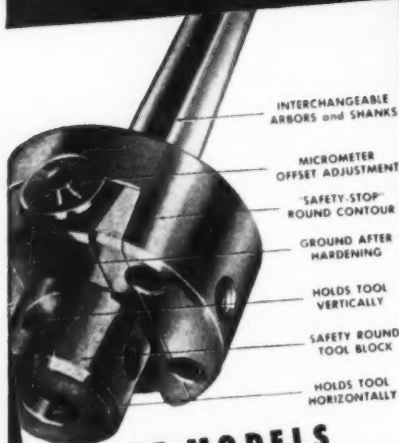
Production figures are extremely difficult to estimate inasmuch as they depend on many factors surrounding the riveting operation. The standard type of riveter can feed and drive a rivet as fast as the machine can be tripped; it then becomes a problem of the com-

plication of the assembly along with the work handling problem at the machine, coupled with the dexterity of the operator. Proper design of component parts can do much to increase production by providing a part readily located on the rollset pin or fixture. Proper facilities for work bins or stacking trays allow the operator to quickly make the complete assembly prior to tripping the machine.

Briefly, then, we have described

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T & S rivets, machines and tools. As a matter of record many additional remarks could be added; however, their value would be limited to specific applications or specific rivets and setting equipment. The foregoing may serve as general discussion set down to acquaint the present or potential rivet consumer with a few facts concerning this portion of the fastener industry. There are thousands of rivet applications still in the design and experimental stages. An intelligent approach to the methods and requirements for automatic riveting will pay off in lowered costs and increased production.

The End



"I don't dare disturb Borden, he's meditating a strike."

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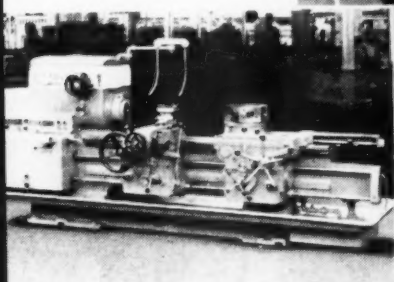
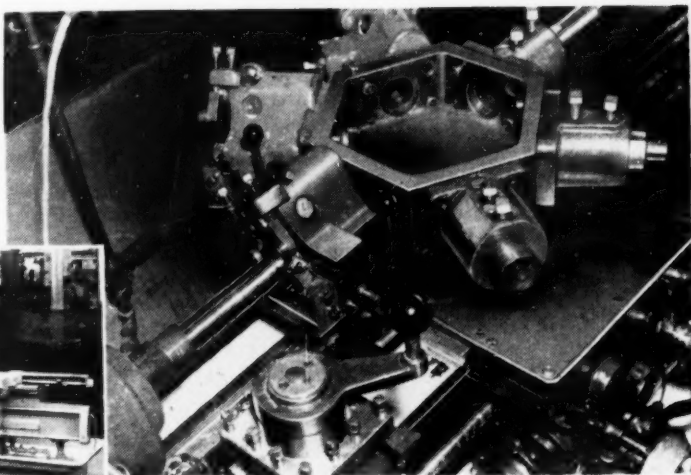




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SPECIAL MACHINES**

## **GISHOLT MACHINE COMPANY**

MADISON 10, WISCONSIN



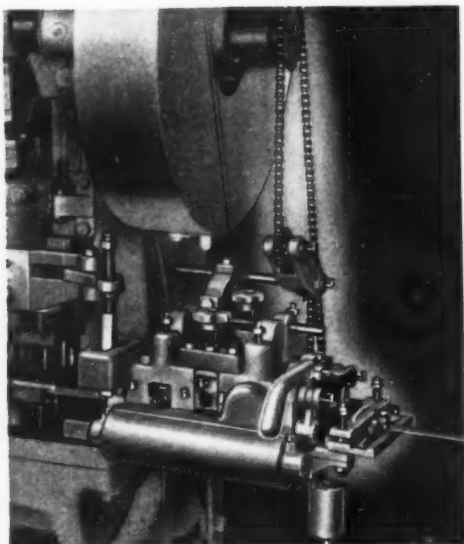
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*Automatic*  
**ROLL FEEDS AND  
REEL STANDS**



# BLUE BOOK'S Know How Reference Sheets

## Chemical Compositions of SAE Carbon Steels

LADLE CHEMICAL COMPOSITION\* LIMITS, %

SAE No.	C	Mn	Max. P	Max. S	AISI No.
1006	0.08 max	0.25-0.40	0.040	0.050	C1006
1008	0.10 max	0.25-0.50	0.040	0.050	C1008
1010	0.08-0.13	0.30-0.60	0.040	0.050	C1010
1015	0.13-0.18	0.30-0.60	0.040	0.050	C1015
1016	0.13-0.18	0.60-0.90	0.040	0.050	C1016
1017	0.15-0.20	0.30-0.60	0.040	0.050	C1017
1018	0.15-0.20	0.60-0.90	0.040	0.050	C1018
1019	0.15-0.20	0.70-1.00	0.040	0.050	C1019
1020	0.18-0.23	0.30-0.60	0.040	0.050	C1020
1021	0.18-0.23	0.60-0.90	0.040	0.050	C1021
1022	0.18-0.23	0.70-1.00	0.040	0.050	C1022
1024	0.19-0.25	1.35-1.65	0.040	0.050	C1024
1025	0.22-0.28	0.30-0.60	0.040	0.050	C1025
1026	0.22-0.28	0.60-0.90	0.040	0.050	C1026
1027	0.22-0.29	1.20-1.50	0.040	0.050	C1027
1030	0.28-0.34	0.60-0.90	0.040	0.050	C1030
1033	0.30-0.36	0.70-1.00	0.040	0.050	C1033
1034	0.32-0.38	0.50-0.80	0.040	0.050	C1034
1035	0.32-0.38	0.60-0.90	0.040	0.050	C1035
1036	0.30-0.37	1.20-1.50	0.040	0.050	C1036
1038	0.35-0.42	0.60-0.90	0.040	0.050	C1038
1039	0.37-0.44	0.70-1.00	0.040	0.050	C1039
1040	0.37-0.44	0.60-0.90	0.040	0.050	C1040
1041	0.36-0.44	1.35-1.65	0.040	0.050	C1041
1042	0.40-0.47	0.60-0.90	0.040	0.050	C1042
1043	0.40-0.47	0.70-1.00	0.040	0.050	C1043
1045	0.43-0.50	0.60-0.90	0.040	0.050	C1045
1046	0.43-0.50	0.70-1.00	0.040	0.050	C1046
1049	0.46-0.53	0.60-0.90	0.040	0.050	C1049
1050	0.48-0.55	0.60-0.90	0.040	0.050	C1050
1052	0.47-0.55	1.20-1.50	0.040	0.050	C1052
1055	0.50-0.60	0.60-0.90	0.040	0.050	C1055
1060	0.55-0.65	0.60-0.90	0.040	0.050	C1060
1062	0.54-0.65	0.85-1.15	0.040	0.050	C1062
1064	0.60-0.70	0.50-0.80	0.040	0.050	C1064
1065	0.60-0.70	0.60-0.90	0.040	0.050	C1065
1066	0.60-0.71	0.85-1.15	0.040	0.050	C1066
1070	0.65-0.75	0.60-0.90	0.040	0.050	C1070
1074	0.70-0.80	0.50-0.80	0.040	0.050	C1074
1078	0.72-0.85	0.30-0.60	0.040	0.050	C1078
1080	0.75-0.88	0.60-0.90	0.040	0.050	C1080
1085	0.80-0.93	0.70-1.00	0.040	0.050	C1085
1086	0.82-0.95	0.30-0.50	0.040	0.050	C1086
1090	0.85-0.98	0.60-0.90	0.040	0.050	C1090
1095	0.90-1.03	0.30-0.50	0.040	0.050	C1095

\*Where silicon is required, the following limits and ranges are commonly used for basic open-hearth steel grades: for steel designations up to but excluding SAE

FREE CUTTING STEEL COMPOSITIONS

LADLE CHEMICAL COMPOSITION† LIMITS, %

SAE No.	C	Mn	P	S	AISI No.
1111	0.13 max	0.60-0.90	0.70-0.12	0.08-0.15	B1111+
1112	0.13 max	0.70-1.00	0.07-0.12	0.16-0.23	B1112+
1113	0.13 max	0.70-1.00	0.07-0.12	0.24-0.33	B1113+
1109	0.08-0.13	0.60-0.90	0.040	0.08-0.13	C1109
1114	0.10-0.16	1.00-1.30	0.040	0.08-0.13	C1114
1115	0.13-0.18	0.60-0.90	0.040	0.08-0.13	C1115
1116	0.14-0.20	1.00-1.40	0.040	0.16-0.23	C1116
1117	0.14-0.20	1.00-1.30	0.040	0.08-0.13	C1117
1118	0.14-0.20	1.30-1.60	0.040	0.08-0.13	C1118
1119	0.14-0.20	1.00-1.30	0.040	0.24-0.33	C1119
1120	0.18-0.23	0.70-1.00	0.040	0.08-0.13	C1120
1126	0.23-0.29	0.70-1.00	0.040	0.08-0.13	C1126
1132	0.27-0.34	1.35-1.65	0.040	0.08-0.13	C1132
1137	0.32-0.39	1.35-1.65	0.040	0.08-0.13	C1137
1138	0.34-0.40	0.70-1.00	0.040	0.08-0.13	C1138
1140	0.37-0.44	0.70-1.00	0.040	0.08-0.13	C1140
1141	0.37-0.45	1.35-1.65	0.040	0.08-0.13	C1141
1144	0.40-0.48	1.35-1.65	0.040	0.24-0.33	C1144
1145	0.42-0.49	0.70-1.00	0.040	0.04-0.07	C1145
1146	0.42-0.49	0.70-1.00	0.040	0.08-0.13	C1146
1151	0.48-0.55	0.70-1.00	0.040	0.08-0.13	C1151

\*When silicon is required, the following limits and ranges are commonly used for basic open-hearth steel grades: for steel designations up to but excluding SAE 1114, 0.10% maximum; for SAE 1114 and over, 0.10 maximum or the ranges of 0.10 to 0.20% or 0.15 to 0.30%.

†Because of the technological nature of the process, acid bessemer steels are not furnished with specified silicon content.

## Chemical Compositions of SAE Alloy Steels

### MANGANESE STEELS

LADLE CHEMICAL COMPOSITION LIMITS, %

SAE No.	C	Mn	Max. P	Max. S	Si	AISI No.
1320	0.18-0.23	1.60-1.90	0.040	0.040	0.20-0.35	1320
1330	0.28-0.33	1.60-1.90	0.040	0.040	0.20-0.35	1330
1335	0.33-0.38	1.60-1.90	0.040	0.040	0.20-0.35	1335
1340	0.38-0.43	1.60-1.90	0.040	0.040	0.20-0.35	1340

### NICKEL STEELS

LADLE CHEMICAL COMPOSITION LIMITS, %

SAE Number	C	Mn	Maximum P	Maximum S	Si	Ni	AISI Number
2317	0.15-0.20	0.40-0.60	0.040	0.040	0.20-0.35	3.25-3.75	2317
2330	0.28-0.33	0.60-0.80	0.040	0.040	0.20-0.35	3.25-3.75	2330
2340	0.38-0.43	0.70-0.90	0.040	0.040	0.20-0.35	3.25-3.75	2340
2345	0.43-0.48	0.70-0.90	0.040	0.040	0.20-0.35	3.25-3.75	2345
2512*	0.09-0.14	0.45-0.60	0.025	0.025	0.20-0.35	4.75-5.25	E2512
2515	0.12-0.17	0.48-0.60	0.040	0.040	0.20-0.35	4.75-5.25	2515
2517*	0.15-0.20	0.45-0.60	0.025	0.025	0.20-0.35	4.75-5.25	E2517

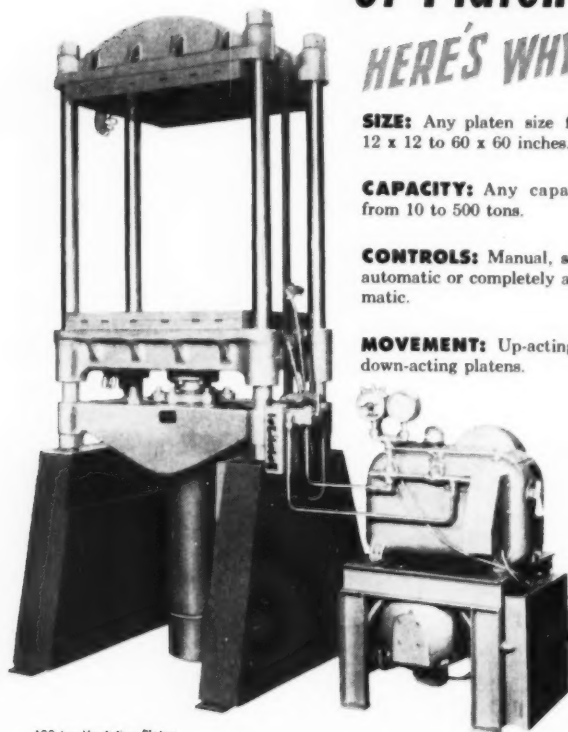
\* Electric-furnace steel.

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HYDRAULIC POWER EQUIPMENT

# BLUE BOOK'S Know How Reference Sheets

## NICKEL-CHROMIUM STEELS

LADLE CHEMICAL COMPOSITION LIMITS, %

SAE Num- ber	C	Mn	P	S	Si	Ni	Cr	AISI Num- ber
3115	0.13-0.18	0.40-0.60	0.040	0.040	0.20-0.35	1.10-1.40	0.35-0.75	3115
3120	0.17-0.22	0.60-0.80	0.040	0.040	0.20-0.35	1.10-1.40	0.55-0.75	3120
3130	0.28-0.33	0.60-0.80	0.040	0.040	0.20-0.35	1.10-1.40	0.55-0.75	3130
3135	0.33-0.38	0.60-0.80	0.040	0.040	0.20-0.35	1.10-1.40	0.55-0.75	3135
3140	0.38-0.43	0.70-0.90	0.040	0.040	0.20-0.35	1.10-1.40	0.55-0.75	3140
3145	0.43-0.48	0.70-0.90	0.040	0.040	0.20-0.35	1.10-1.40	0.70-0.90	3145
3150	0.48-0.53	0.70-0.90	0.040	0.040	0.20-0.35	1.10-1.40	0.70-0.90	3150
3310*	0.08-0.13	0.45-0.60	0.025	0.025	0.20-0.35	3.25-3.75	1.40-1.75	E3310
3316*	0.14-0.19	0.45-0.60	0.025	0.025	0.20-0.35	3.25-3.75	1.40-1.75	E3316

\* Electric-furnace steel.

## MOLYBDENUM STEELS

LADLE CHEMICAL COMPOSITION LIMITS, %

SAE Number	C	Mn	P	S	Si	Mo	AISI Number
4017	0.15-0.20	0.70-0.90	0.040	0.040	0.20-0.35	0.20-0.30	4017
4023	0.20-0.25	0.70-0.90	0.040	0.040	0.20-0.35	0.20-0.30	4023
4024	0.20-0.25	0.70-0.90	0.040	0.035 0.050	0.20-0.35	0.20-0.30	4024
4027	0.25-0.30	0.70-0.90	0.040	0.040	0.20-0.35	0.20-0.30	4027
4028	0.25-0.30	0.70-0.90	0.040	0.035 0.050	0.20-0.35	0.20-0.30	4028
4032	0.30-0.35	0.70-0.90	0.040	0.040	0.20-0.35	0.20-0.30	4032
4037	0.35-0.40	0.70-0.90	0.040	0.040	0.20-0.35	0.20-0.30	4037
4042	0.40-0.45	0.70-0.90	0.040	0.040	0.20-0.35	0.20-0.30	4042
4047	0.45-0.50	0.70-0.90	0.040	0.040	0.20-0.35	0.20-0.30	4047
4053	0.50-0.56	0.75-1.00	0.040	0.040	0.20-0.35	0.20-0.30	4053
4063	0.60-0.67	0.75-1.00	0.040	0.040	0.20-0.35	0.20-0.30	4063
4068	0.63-0.70	0.75-1.00	0.040	0.040	0.20-0.35	0.20-0.30	4068

## CHROMIUM-MOLYBDENUM STEELS

LADLE CHEMICAL COMPOSITION LIMITS, %

SAE No.	C	Mn	Max. P	Max. S	Si	Ni	Cr	Mo	AISI No.
4118	0.18-0.23	0.70-0.90	0.040	0.040	0.20-0.35	—	0.40-0.60	0.08-0.15	4118
4119	0.17-0.22	0.70-0.90	0.040	0.040	0.20-0.35	—	0.40-0.60	0.20-0.30	—
4130	0.28-0.33	0.40-0.60	0.040	0.040	0.20-0.35	—	0.80-1.10	0.15-0.25	4130
4137	0.35-0.40	0.70-0.90	0.040	0.040	0.20-0.35	—	0.80-1.10	0.15-0.25	4137
4140	0.38-0.43	0.75-1.00	0.040	0.040	0.20-0.35	—	0.80-1.10	0.15-0.25	4140
4145	0.43-0.48	0.75-1.00	0.040	0.040	0.20-0.35	—	0.80-1.10	0.15-0.25	4145
4150	0.48-0.53	0.75-1.00	0.040	0.040	0.20-0.35	—	0.80-1.10	0.15-0.25	4150

## NICKEL-CHROMIUM MOLYBDENUM STEELS

SAE No.	C	Mn	Max. P	Max. S	Si	Ni	Cr	Mo	AISI No.
4317	0.15-0.20	0.45-0.65	0.040	0.040	0.20-0.35	1.65-2.00	0.40-0.60	0.20-0.30	4317
4320	0.17-0.22	0.45-0.65	0.040	0.040	0.20-0.35	1.65-2.00	0.40-0.60	0.20-0.30	4320
4340	0.38-0.43	0.60-0.80	0.040	0.040	0.20-0.35	1.65-2.00	0.70-0.90	0.20-0.30	4340

## NICKEL-MOLYBDENUM STEELS

SAE No.	C	Mn	Max. P	Max. S	Si	Ni	Cr	Mo	AISI No.
4608	0.06-0.11	0.25-0.45	0.040	0.040	0.25 max	1.40-1.75	—	0.15-0.25	4608
4615	0.13-0.18	0.45-0.65	0.040	0.040	0.20-0.35	1.65-2.00	—	0.20-0.30	4615
4617	0.15-0.20	0.45-0.65	0.040	0.040	0.20-0.35	1.65-2.00	—	0.20-0.30	—
4620	0.17-0.22	0.45-0.65	0.040	0.040	0.20-0.35	1.65-2.00	—	0.20-0.30	4620
X4620	0.18-0.23	0.50-0.70	0.040	0.040	0.20-0.35	1.65-2.00	—	0.20-0.30	—
4621	0.18-0.23	0.70-0.90	0.040	0.040	0.20-0.35	1.65-2.00	—	0.20-0.30	4621
4640	0.38-0.43	0.60-0.80	0.040	0.040	0.20-0.35	1.65-2.00	—	0.20-0.30	4640
4812	0.10-0.15	0.40-0.60	0.040	0.040	0.20-0.35	3.25-3.75	—	0.20-0.30	4812
4815	0.13-0.18	0.40-0.60	0.040	0.040	0.20-0.35	3.25-3.75	—	0.20-0.30	4815
4817	0.15-0.20	0.40-0.60	0.040	0.040	0.20-0.35	3.25-3.75	—	0.20-0.30	4817
4820	0.18-0.23	0.50-0.70	0.040	0.040	0.20-0.35	3.25-3.75	—	0.20-0.30	4820

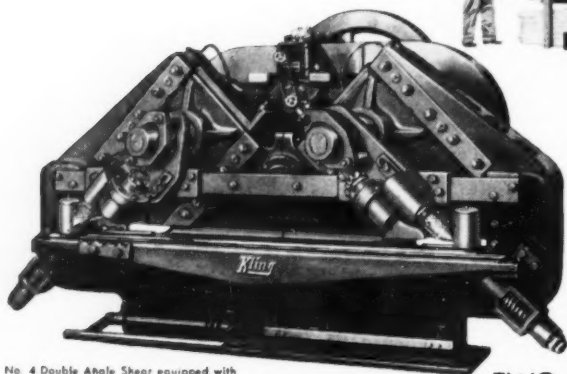
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# BLUE BOOK'S "Know How" Reference Sheets

## CHROMIUM STEELS

### LADLE CHEMICAL COMPOSITION LIMITS, %

SAE Number	C	Mn	Maximum		Si	Cr	AISI Number
			P	S			
5045	0.43-0.48	0.70-0.90	0.040	0.040	0.20-0.35	0.55-0.75	5045
5046	0.43-0.50	0.75-1.00	0.040	0.040	0.20-0.35	0.20-0.35	5046
5115	0.13-0.18	0.70-0.90	0.040	0.040	0.20-0.35	0.70-0.90	—
5120	0.17-0.22	0.70-0.90	0.040	0.040	0.20-0.35	0.70-0.90	5120
5130	0.28-0.33	0.70-0.90	0.040	0.040	0.20-0.35	0.80-1.10	5130
5132	0.30-0.35	0.60-0.80	0.040	0.040	0.20-0.35	0.75-1.00	5132
5135	0.33-0.38	0.60-0.80	0.040	0.040	0.20-0.35	0.80-1.05	5135
5140	0.38-0.43	0.70-0.90	0.040	0.040	0.20-0.35	0.70-0.90	5140
5145	0.43-0.48	0.70-0.90	0.040	0.040	0.20-0.35	0.70-0.90	5145
5147	0.45-0.52	0.70-0.95	0.040	0.040	0.20-0.35	0.85-1.15	5147
5150	0.48-0.53	0.70-0.90	0.040	0.040	0.20-0.35	0.70-0.90	5150
5152	0.48-0.55	0.70-0.90	0.040	0.040	0.20-0.35	0.90-1.20	5152
5155	0.50-0.60	0.70-0.90	0.040	0.040	0.20-0.35	0.70-0.90	5155
5160	0.55-0.65	0.75-1.00	0.040	0.040	0.20-0.35	0.70-0.90	5160
50100*	0.95-1.10	0.25-0.45	0.025	0.025	0.20-0.35	0.40-0.60	E50100
51100*	0.95-1.10	0.25-0.45	0.025	0.025	0.20-0.35	0.90-1.15	E51100
52100*	0.95-1.10	0.25-0.45	0.025	0.025	0.20-0.35	1.30-1.60	E52100

\*Electric furnace steel.

## CHROMIUM-VANADIUM STEELS

### LADLE CHEMICAL COMPOSITION LIMITS, %

SAE Number	C	Mn	Maximum		Si	Cr	V	AISI Number
			P	S				
6150	0.48-0.53	0.70-0.90	0.040	0.040	0.20-0.35	0.80-1.10	0.15	6150

## SILICON-MANGANESE STEELS

### LADLE CHEMICAL COMPOSITION LIMITS, %

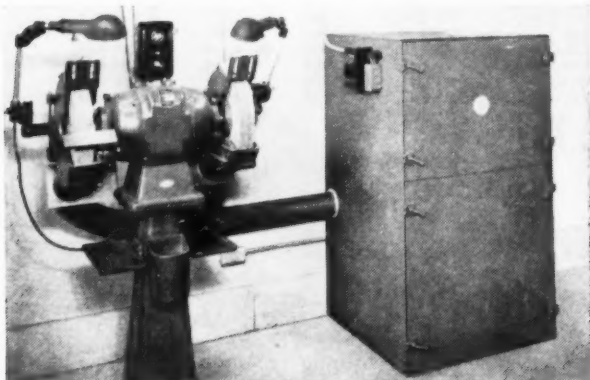
SAE Number	C	Mn	Maximum		Si	Cr	AISI Number
			P	S			
9254	0.50-0.60	0.50-0.80	0.040	0.040	1.20-1.60	0.10-0.80	—
9255	0.50-0.60	0.70-0.95	0.040	0.040	1.80-2.20	—	9255
9260	0.55-0.65	0.70-1.00	0.040	0.040	1.80-2.20	—	9260
9261	0.55-0.65	0.75-1.00	0.040	0.040	1.80-2.20	0.10-0.25	9261
9262	0.55-0.65	0.75-1.00	0.040	0.040	1.80-2.20	0.25-0.40	9262

## NICKEL-CHROMIUM-MOLYBDENUM STEELS

SAE No.	C	Mn	P	S	Si	Ni	Cr	Mo	AISI No.
8615	0.13-0.18	0.70-0.90	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8615
8617	0.15-0.20	0.70-0.90	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8617
8620	0.18-0.23	0.70-0.90	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8620
8622	0.20-0.25	0.70-0.90	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8622
8625	0.25-0.28	0.70-0.90	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8625
8627	0.25-0.30	0.70-0.90	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8627
8630	0.28-0.33	0.70-0.90	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8630
8632	0.30-0.35	0.70-0.90	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8632
8635	0.33-0.38	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8635
8637	0.35-0.40	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8637
8640	0.38-0.43	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8640
8641	0.38-0.43	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8641
8642	0.40-0.45	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8642
8645	0.43-0.48	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8645
8647	0.45-0.50	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8647
8650	0.48-0.53	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8650
8653	0.50-0.56	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.50-0.80	0.15-0.25	8653
8655	0.50-0.60	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8655
8660	0.55-0.65	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.15-0.25	8660
8719	0.18-0.23	0.60-0.80	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.20-0.30	8719
8720	0.18-0.23	0.70-0.90	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.20-0.30	8720
8735	0.33-0.38	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.20-0.30	8735
8740	0.38-0.43	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.20-0.30	8740
8745	0.43-0.48	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.20-0.30	8745
8750	0.48-0.53	0.75-1.00	0.040	0.040	0.20-0.35	0.40-0.70	0.40-0.60	0.20-0.30	8750
9310*	0.08-0.13	0.45-0.65	0.025	0.025	0.20-0.35	3.00-3.50	1.00-1.40	0.08-0.15	E9310
9315*	0.13-0.18	0.45-0.65	0.025	0.025	0.20-0.35	3.00-3.50	1.00-1.40	0.08-0.15	E9315
9317*	0.15-0.20	0.45-0.65	0.025	0.025	0.20-0.35	3.00-3.50	1.00-1.40	0.08-0.15	E9317
9840	0.38-0.43	0.70-0.90	0.040	0.040	0.20-0.35	0.85-1.15	0.70-0.90	0.20-0.30	9840

\*Electric-furnace steel.





## ... from abrasive dust hazards with TORIT DUST COLLECTORS

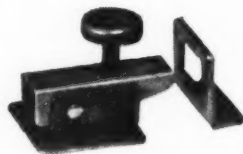
Here is a safe grinding installation. Guarded wheels, localized lighting, a well placed starting switch, and most of all hoods and piping leading to a Torit Dust Collector. Here no abrasive dusts will hamper working conditions or cause damage to finished parts or expensive equipment.

To score top production in your plant play it safe. Equip machines with Torit Dust Collectors. There are types for all standard dust problems and for inking after inking they'll keep your plant from being caught off-base by uncomfortable and dangerous dust conditions. Your team will play ball right up to the last pitch.

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or write for copy

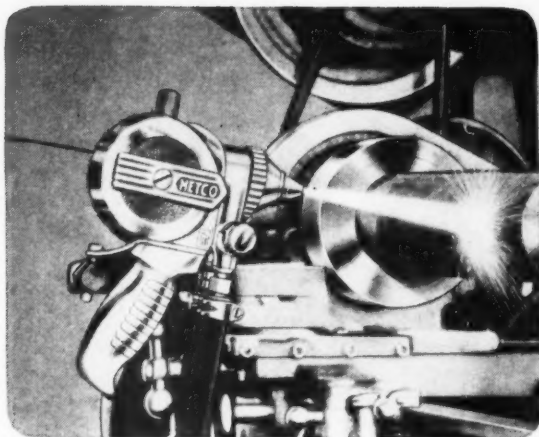


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with the new  
**Metco L-Gun**

**New, low, compressed-air requirements... only 10 cfm at 40 to 60 psi, already available in many shops, or supplied by inexpensive 3 hp compressor... bring metallizing within reach of the small user.**

Here's a chance for the smaller maintenance shop to get into profitable metallizing operations like these:

- ▶ Save up to 90% of replacement costs on machine repair jobs.
- ▶ Do your own hard-facing.
- ▶ Apply long-wearing corrosion-resistant coatings to exterior plant structures, tanks and other equipment.

**Sprays 23 Different Metallizing Wires—**With the new L-Gun you can spray 10, 25, 80 carbon steels, stainless, babbits, brass, bronze, nickel, aluminum, tin, zinc, special hard-facing materials such as Metco-Weld H, and the new self-bonding Sprabond wire.

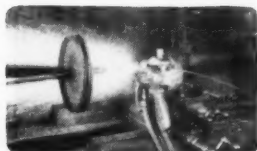
**It's Versatile—**Use the L-Gun machine-mounted or hand-held—it weighs only 4 lb 2 oz. Do all kinds of metallizing work—shaft and bore build-up with harder, longer wearing metals, build up worn pump plungers, crankshafts, motor shafts; apply corrosion-resistant coatings. There are hundreds of different jobs that are "naturals" for metallizing.

**Same High Quality as Other Metco Guns—**The low air requirements of the new L-Gun have been achieved without any

sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction—is built, like all Metco guns, for rugged, dependable service.

**A Real Opportunity for the Smaller Shop—**Thousands of large, well-known companies have been metallizing users for many years, not only in maintenance but in production applications on original equipment. Now, with the development of the new L-Gun, and a low cost installation, metallizing is within the reach of even the smallest plant. (We'll be glad to send you the names of some Metco users—large and small.)

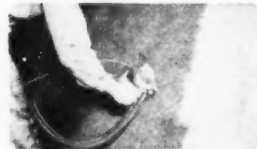
**Free Bulletin or Shop Demonstration—**Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Metco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course.



Metallizing damaged journals on turbine shaft



Building up worn brake-drum



Metallizing protective coating on steel plate

See other examples of metallizing illustrated in our 8-page Bulletin in your Sweet's Plant Engineering File—Section 7a/Me.

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Completely NEW from base to wheel head. Designed with these extra features to give you FASTER grinding performance.

- Direct drive Excella Spindles
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- Power table traverse
- Automatic table infeed

The new Sterling Model "G" can easily handle all the tool and cutter grinding in the average shop. Available in either the Universal or Plain grinder.

**SAVE TIME and do those EXTRA jobs  
with a Model "G" Sterling grinder**

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gives you complete information and specifications on the **STERLING Model "G" grinder**. Just drop us a post card for your free copy.

**A special report  
by the editors of  
MACHINE and TOOL  
BLUE BOOK**

**Report number 29**

## **Grinding Machines . . . part 3 Tool and Cutter Grinders**

This is the twenty-ninth in a monthly series of special reports discussing various types of machine tools. Included in this month's special report on grinding machines are:

1. Formed cutters and special grinders; Taps; Special wheel shapes; Overheating; Dry grinding; Wet grinding; Applying the fluids; Marking of cutters; The insufficient diamond supply; New methods of grinding.
2. Descriptions of late model grinding machines.
3. Specifications of American-built machines.

Previously published reports discussed: 1. Thread Rolling; 2. Power Press Brakes; 3, 4, 5. Milling machines; 6. Honing, Lapping, and Superfinishing; 7. Automatic Screw machines; 8. MAPI Replacement Formula; 9, 10. Chucking machines, Turret Lathes, Hand Screw machines; 11. Broaching machines; 12. Shapers, Slotters, Keyseaters; 13, 14, 15. Lathes; 16. Planers; 17. Gear making machines; 18, 19. Boring machines; 20, 21, 22, 23, 24, 25, 26. Drilling machines; 27, 28. Grinding machines.

### **Formed cutters and special grinders**

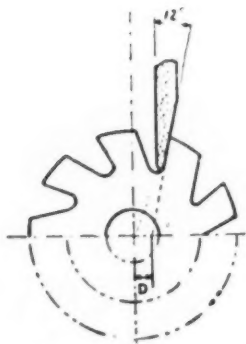
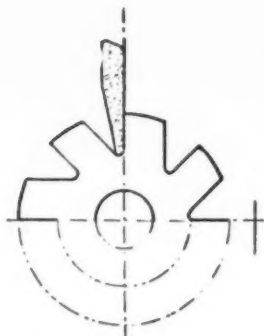
by **M. Bryan Baker**, Associate Editor

WITH FORMED cutters and all tools in this class, it is often essential that the teeth keep their shape exactly after repeated grinding; this applies to carbide as well as high speed steel. The form on each tooth extends from the cutting edge to the heel of the tooth, figures 1 and 2. For this reason, it is sometimes easier to employ special cutter sharpening machines, flute grinders, drill grinders, radial relief grinders, chamfer grinders, circularity grinding attachments, etc., for a precise job. Generally, the work to be ground is held in a collet or between dead centers, and revolved

on its own axis. These grinders permit fast, efficient grinding of form relief, radial relief, form and radial relief together, tapered cylindrical and straight cylindrical. Space doesn't permit an exhaustive treatment of the handling of these tools (i. e. taps, step drills, boring bars, reamers, counterbores, spherical cutters, profile mills, hollow mills, gear tooth rounding cutters, center drills, etc.) however, an inquiry to firms making such special equipment will bring details for specific tool grinding problems.

Many machinists and tool room men will insist on radially relieved cutters,

**Position of  
wheel face  
and cutter  
for radial  
type cutter**



**Position of  
wheel face  
and cutter  
for offset  
cutter**

1. The grinding of formed gear cutter grinding is simple but the following precautions should be followed: (1) the wheel face must be aligned with the radial center line of the cutter except when grinding offset cutters; (2) the wheel face must be trued carefully with the diamond held in a fixture; (3) the wheel must be located carefully with respect to the work; (4) the grinding is generally done on the side of a dish wheel; (5) the feeds must be light.

contending they perform longer and better. Instead of the individual straight planes of the angles, such as primary and secondary relief angles, the grinding of a radial relief removes a minimum of stock behind the cutting edge resulting in a stronger tool, advocates point out, figure 3.

In formed cutters the relief is in the form of an eccentric circle arc. Sharpening is done on the face, which may or may not be radial. If it was radial originally, it must be sharpened so as to keep it radial or the tooth shape will be altered. Since the relief is eccentric it increases slightly as the face is ground back, but not enough to change the form to any great extent.

Formed cutters such as gear cutters must be ground radially and equidistantly so as to preserve the form of the tool. The face of the wheel must align with the radial center line of the cutter as shown in figure 1. An exception to this rule is found in offset cutters. Form cutters can be ground on a cutter grinder or on a surface grinder with the proper fixtures. The tooth rest is on the back of the tooth being ground.

In peripheral milling cutters such as slab mills, slotting cutters, saws, etc., tipped with sintered carbide, the rake angle is thought of as the angle in degrees measuring the deviation of the tooth face from a radial line to the cutting edge. This is considered the radial relief angle (see figure 3, MACHINE and TOOL BLUE BOOK'S special grinding report for April, 1953). Cutters of this type generally have negative radial rake angles of  $5^\circ$  for soft low carbon steel to  $10^\circ$  or more for alloy steel, and positive axial rake angles of  $5^\circ$  to  $10^\circ$ , respectively, which in some cases may be  $0^\circ$  in slotting cutters and saws. On soft materials such as free cutting aluminum alloys, positive rake angles of  $10^\circ$  to  $20^\circ$  are often used.

With face milling cutters tipped with sintered carbide, the teeth are inclined with respect to both radial and axial lines. These angles are called radial and axial rake angles. In face mills great variation is found in the value of the radial and axial rake angles (positive, zero or negative) in relation to the grade of sintered carbide material used, the material being cut, the value of the

# Precision Tap Sharpening and Its Importance To You

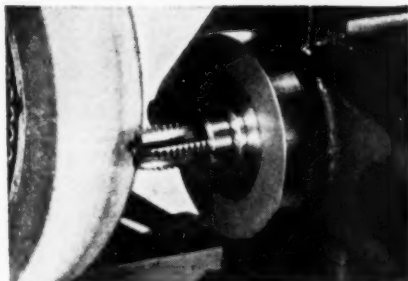
Precision tap sharpening is helping many manufacturers reduce tap costs up to 75%. It also enables them to get greatly increased production from each tap and makes possible a sharp reduction in tap breakage. It can benefit you, too!

## WHAT PRECISION SHARPENING IS

Precision tap sharpening is a method of controlling the accuracy of tap indexing (keeping cutting edges uniform and evenly spaced), controlling the rake angle of cutting edges and providing uniform chamfers. These results enable a tap to cut more accurately and uniformly for a much longer period of time than is possible when the precision sharpening method is not used.

## THE IMPORTANCE OF BLAKE EQUIPMENT

Until the introduction of Blake tap sharpening equipment a few years ago, no practical method was available to realize the benefits of precision sharpening. The Blake Flute Grinder and Blake Chamfer Grinder are recognized today as the only practical means of putting precision sharpening into actual operation.



**TAP IN POSITION FOR PRECISION SHARPENING**

Photograph shows four-fluted tap in correct position for precision chamfer grinding on Blake Tap Chamfer Grinder.

## SEND FOR MORE FACTS NOW!

A recent *Machinery* article, "Why Taps Should Be Sharpened Precisely", contains complete information on this interesting and profitable subject. Write us for your free copy. Bulletins about both Blake machines are also available on request.

**IT'S A FACT! YOU CAN REDUCE YOUR TAP COSTS 50 to 75% by installing Blake tap sharpening equipment and sharpening your taps as you do other metal cutting tools.**

**PUT THIS COST-CUTTING COMBINATION TO WORK FOR YOU NOW!**



**BLAKE CHAMFER GRINDER**  
(Described in Bulletin 552)



**BLAKE FLUTE GRINDER**  
(Described in Bulletin 651)

**ACCURATE, TRUE-CUTTING TAPS  
LESS TAP BREAKAGE  
= 600% MORE PRODUCTION PER TAP  
UP TO 75% REDUCTION IN TAP COSTS**

*Write for details about both machines!*

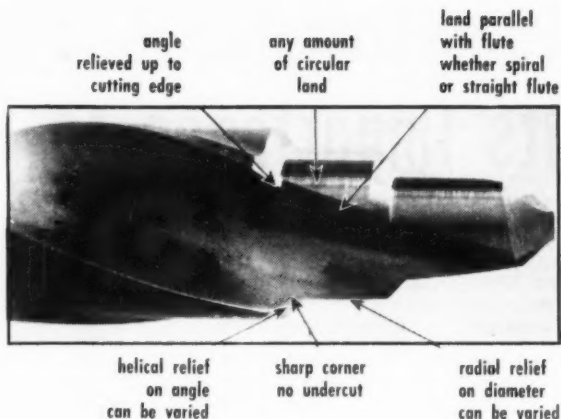
**EDWARD BLAKE COMPANY** 440 CHERRY ST., WEST NEWTON 65  
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BLACK DIAMOND PRECISION DRILL GRINDERS . . .

WALTHAM CUTTER SHARPENERS . . . SURFACE FINISH STANDARDS



2. This shows various points of a step drill that have been radially relieved. A minimum of stock behind the cutting edge is removed, giving more strength to the parts under stress.



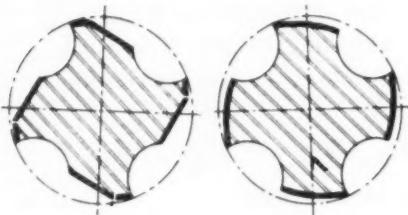
corner angle and setup conditions.

In tools such as reamers, the sharpening process is quite delicate, figure 4. A higher degree of accuracy is required in reamers than in milling cutters, for instance. An error of a few minutes in the clearance angle of a milling cutter does not perceptibly affect the results, but the clearance angle of a reamer must be correct to within a few minutes or unsatisfactory results will follow (see reamer article, MACHINE and TOOL BLUE BOOK, page 174, April, 1953).

### Taps

Such strides have been made in the last few years concerning treatment of taps that they warrant brief mention

3. At the left is shown, in exaggerated form, angular relief and at the right the radial relief type of tool grinding.



here. Special grinders have been developed (figures 5 & 6) for them as well as for other tools mentioned above.

At one time little consideration was given to pitch diameter of taps, but now they are being produced with this important feature very accurate and uniform. Sometimes taps cut inaccurately because of errors in rake angle and inaccurate indexing of the cutting edges during the sharpening process. Lapping by hand and etching, once accepted, are now frowned upon by most machinists.

In speaking of "precision sharpening" the term ordinarily carries with it the thought of "concentricity of the chamfer with the threads"—the chamfer relief is the same on all lands and of the correct amount. It also means that the cutting edges of the teeth are exactly spaced with relation to one another. If one cutting edge carries a heavier chip load, it makes the tap run out and cut oversize, or break. Too, precision ground means that the rake angle of the cutting teeth is the same on all flutes, and is the correct angle for the particular job for which the tool is used. Proper angles are important for the straight flutes of ordinary taps as well as the spiral point types. Through experience, tables of standard



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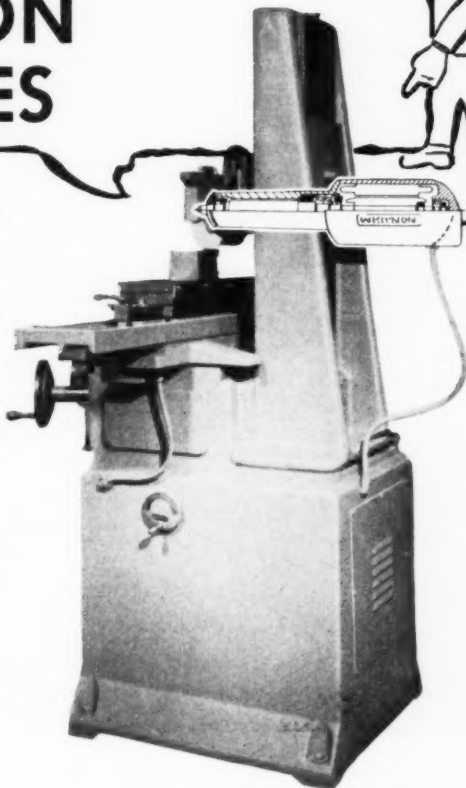
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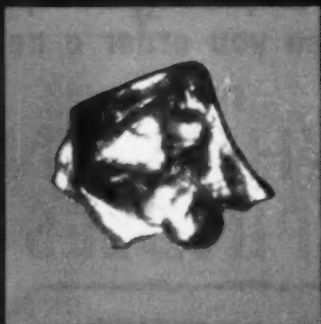
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process is a true metal cutting process. The millions of grinding grits in a grinding wheel do not abrade or wear away the surface of a workpiece but form

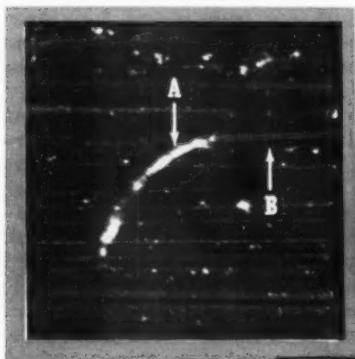
chips which agree in classification with the basic chip types found in other metal cutting processes.

This new concept is not based on hasty conclusions. It represents 25 years of Cincinnati Milling research, coupled with practical experience in applying the basic fundamentals of grinding to a wide variety of work on both centerless and centertype machines.

For you, this means grinding wheels developed and tested over a period of

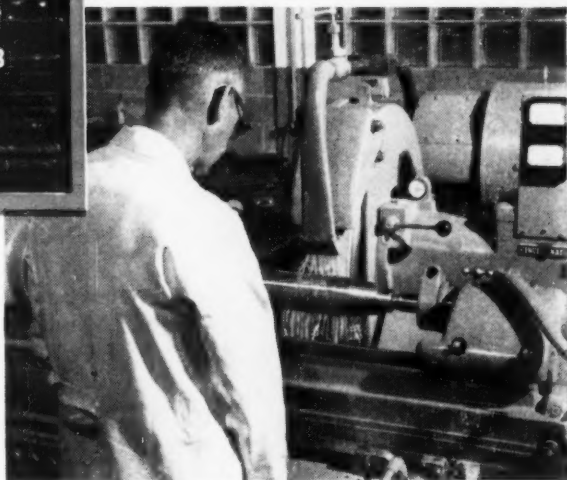
several years on the basis of true function—as true cutting tools forming true chips.

Available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, write, wire, or phone Cincinnati Milling Products Division, The Cincinnati Milling Machine Co.



◀ Ground surface of SAE 3145 steel showing partially formed chip (A) and groove (B) in workpiece from which material of chip was removed.

▼ Performance of experimental wheel is checked by member of research staff.

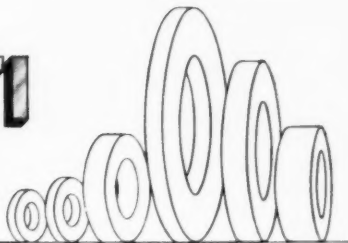


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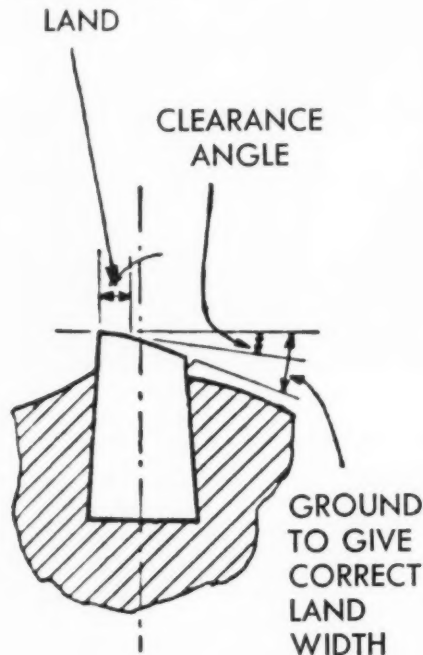


cutting angles and the proper settings on special machines to produce them have been drawn up for various materials. Measuring and properly grinding tap chamfer relief, grinding the spiral point and grinding of the flute are all as important as choosing the right tap for the job.

### Special wheel shapes

Using wheel shapes designed to provide a narrow contact with the work permits using harder wheels and harder bonds with increased efficiency. However, sometimes it is necessary to use

4. A high degree of accuracy is needed when sharpening such tools as reamers. Since a narrow land of constant width is required, two settings are necessary: (1) sharpening the reamer by grinding the proper clearance angle; (2) grinding off the heel of the blade to bring the land to the desired width.



specially shaped diamond wheels for special machines or for unusual operations. Before the user designs a wheel for such use it is advisable to look into the matter with the manufacturer of the wheel. This report to the company should include a description of the job, the machine on which the work is to be ground and a sketch if possible. Diamond wheels usually require an individual mold for each shape. They cannot ordinarily be cut to any special shape required. Standard diamond wheel shapes (note chart) have been designed to provide the most efficient use of the diamond abrasive for the great majority of work.

The selection of a diamond grinding wheel is governed by the type of operation, the speed available in the machine and the degree of finish desired. With a wheel of 80 to 150 grit it is comparatively easy to rough grind for stock removal. An excellent cutting edge can be obtained with 180 to 240 grit wheels and for special cases a mirror finish can be produced with 320 to 500 grit wheels. The surface speed of the grinding wheel is generally 5000 to 5500 ft. per minute.

### Overheating

Overheating is one of the most prevalent causes of diamond wheel failure. It is caused sometimes by excessive pressures or down feeds, improper wheel speeds, lack of proper coolant and inadequate dressing.

The resinoid bonds are oxidizable. That is, they can be burned by excessive heat. In the least severe cases this burning may be reflected in nothing more than excessive wear on the wheel. Sometimes this condition cannot be noted by the eye alone. Slight oxidation involves the burning away of the surface bond, exposing a greater portion of the surface diamonds. These diamonds, being thus less firmly held, are more readily pulled out in the course of normal grinding. As this progresses,

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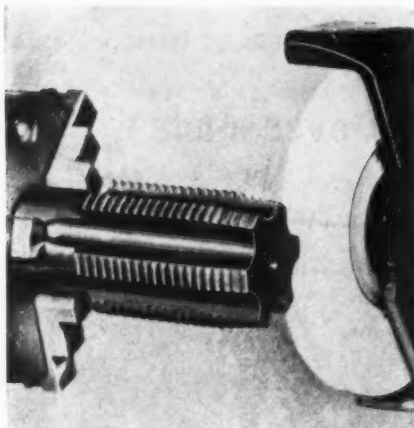
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**5. The important** process of tap chamfer grinding is shown here. Although some fixtures mount the tool between dead centers this one is mounted in a chuck. Because of positive mechanical controls that enable the machine to grind uniform relief on the chamfer of each land, increasing greatly the life and usefulness of taps, reamers, drills, etc., investment in these machines or attachments soon pays for itself in the average shop. Use of a contact gage for centering is often necessary.

rapid wheel wear naturally develops. As overheating becomes still more severe the burning penetrates deeper into the diamond section and the charring of the bond becomes apparent to the eye. In extreme cases of overheating the bond chars and the diamond section of the wheel develops cracks. The greater the heat generated the greater the penetration into the diamond section. Finally this will result in spalling and stripping of the diamond section.

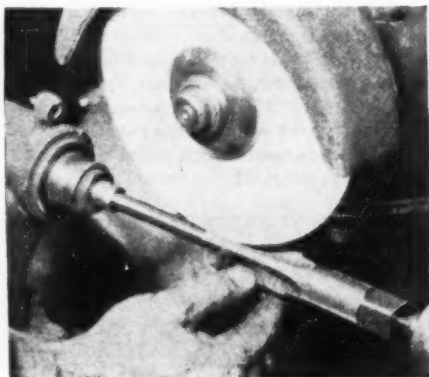
When the diamond resinoid bonded wheel is simply too hard for the operation, overheating of the diamond section shows up in short wheel life, cracking, spalling or stripping.

Excessive pressures and down feeds,

high wheel speeds and lack of proper coolant will all develop excessive heat. Regardless of how it is produced, the affect of too much heat is very much the same. It is a good practice to consult the speed and feed charts of the particular company from whom the diamond wheels are purchased. In fixed feed grinding, excessive down feeds result in excessive pressures. It has been somewhat established that .001" down feed should not be exceeded for carbide grinding with diamond wheels 120 grit or coarser. With the finer grit wheels, the increments of down feeds should be reduced accordingly. The optimum speed for resinoid bonded wheels and carbide grinding falls between 3000-5000 s.f.p.m. High speeds have been shown to lead to excessive grinding wheel costs.

While the metal bonds are not readily oxidizable, they are subject to damage from overheating. The injury to the wheel shows up in warping or separation of the diamond rim from the back. Although different in appearance, the damage to metal bonded wheels is caused by the same faulty conditions responsible for the damage to resinoid

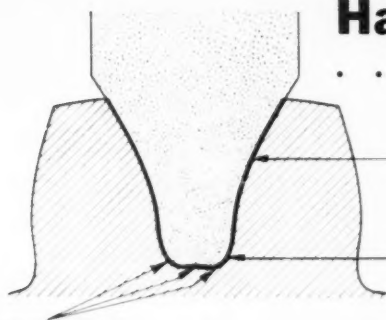
**6. The flutes** of a tap are being reground here. Note the tooth rest blade at the left of the operator's thumb.



# When Aircraft Gears

## Have to be Ground

. . . (or other gears, splines)



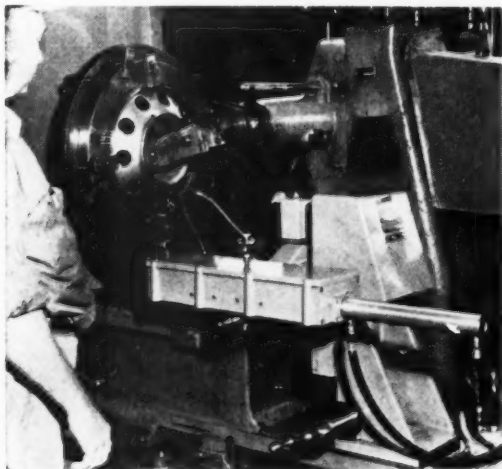
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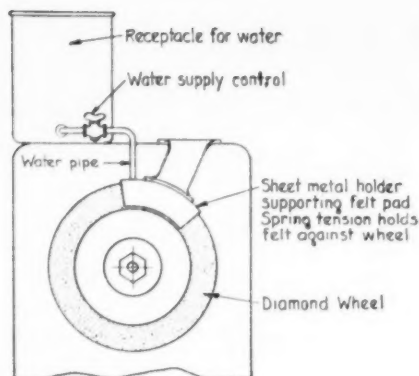
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7. Diagram of the wick method of applying coolant.

bonded wheels already discussed. While the vitrified bonded diamond wheels cannot be oxidized by the grinding temperatures, they are subject to damage by overheating. The visual damage includes cracking, spalling and chipping. The damage to the vitrified wheels is caused by these same faulty conditions or misuse associated with the other bonded wheels.

### Dry grinding

In dry grinding, the temperature rise in the carbide tip is not too great when the recommended grinding technique is followed and the tool kept continuously in motion as it is fed into the wheel. The temperature rise in the tip and tool

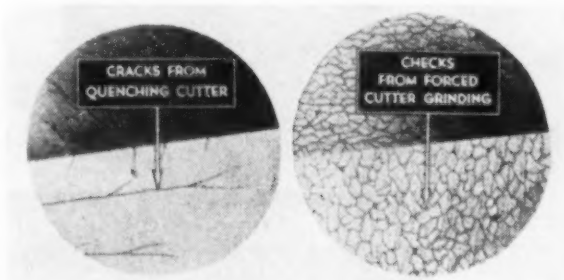
shank is more uniform too. The operator's vision of the work is not obscured here. The wheel balance is less often or less severely disturbed than when grinding wet and the checking and cracking of tips from alternate heating and quenching isn't present. However, there are disadvantages in dry grinding, such as dust. Even seemingly efficient dust control systems are seldom adequate enough to take away all the dust that is naturally created in grinding dry although dust is generally considered less objectionable than the splash from too much coolant. As a softer grade must be used when grinding dry than may be used when grinding wet, wear from the wheel will be greater. The softer wheel is necessary since a hard wheel tends to burn the work.

### Wet grinding

Wet grinding should always be employed when diamond wheels are used; however, for those machines not equipped with a cooling system or where it is absolutely essential for the operator to see the work at all times, either the mist or wick method is recommended, figure 7.

The atomizer method consists of a fine spray on the wheel face and work. It is effective for use with diamond wheels when machines are not equipped with circulating systems. To be used successfully with diamond wheels, a

8. This shows the appearance of tools under the microscope after subjection to two of the most common faults of the machinist.



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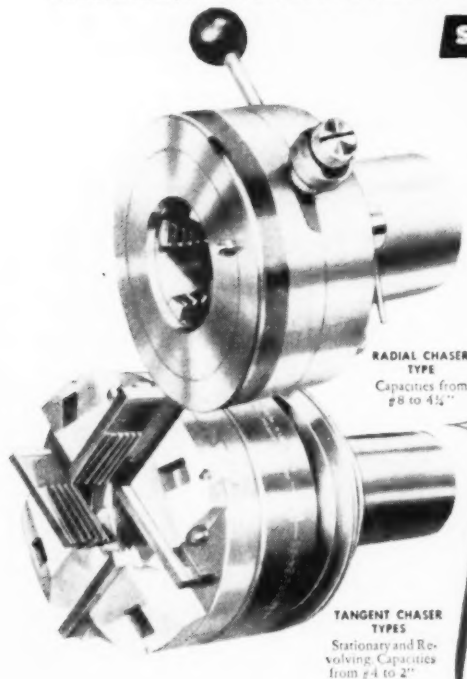
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coolant should always keep the diamond wheel clean and free from gumming and loading; fulfill the coolant requirements of freedom from rancidity, non-injurious to operators and non-inflammable; be free from alkali which might attack the resinoid bonds; and provide good heat dissipating qualities.

The drip method consists in allowing a small amount of the grinding fluid to drip by gravity into the recessed side of the wheel and be carried across the wheel face. The amount used is not sufficient to require a drain. This method is applicable to diamond wheels only. The wick method consists of a piece of felt held by a fixture in contact with the grinding face of the wheel. The wick is kept saturated with light oil. This method is used in diamond

wheels only and when no other method is available.

Some of the silicon carbide wheel grades may be used either wet or dry. If a coolant is used the work should be kept flooded continually. In off-hand grinding there is a tendency to reduce the volume of coolant to prevent splashing but it is better to grind dry than to use insufficient coolant. Too little coolant, as has been pointed out before, causes localized heating and cooling with a resulting cracking of the tools which is worse than no cooling at all, figure 8.

There are many advantages in wet grinding. The dust control problem is eliminated for one thing, wheel wear is reduced—a wheel one grade harder than allowable with dry grinding can be used. The temperature of the tool

**Table of diamond wheel speeds**

(r.p.m. for various sizes of diamond wheels to give peripheral speed in f.p.m.)

<i>Diameter of Wheel in Inches</i>	<i>4,000 S.F.P.M.</i>	<i>4,500 S.F.P.M.</i>	<i>5,000 S.F.P.M.</i>	<i>5,500 S.F.P.M.</i>	<i>6,000 S.F.P.M.</i>
1	15,279	17,189	19,098	21,008	22,918
2	7,639	8,594	9,549	10,504	11,459
3	5,093	5,729	6,366	7,003	7,639
3½	4,366	4,910	5,456	6,002	6,548
4	3,820	4,297	4,775	5,252	5,729
5	3,056	3,438	3,820	4,202	4,584
6	2,546	2,865	3,183	3,501	3,820
7	2,183	2,455	2,728	3,001	3,274
8	1,910	2,148	2,387	2,626	2,865
10	1,528	1,719	1,910	2,101	2,292
12	1,273	1,432	1,591	1,751	1,910
14	1,091	1,228	1,364	1,500	1,637

#### **Finding surface or peripheral speeds**

To find the surface or peripheral speed in feed per minute, multiply the circumference in feet by the r.p.m. To

find the number of r.p.m. knowing the surface speed in feet per minute, divide the surface speed in feet per minute by the circumference in feet.

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is held to a degree low enough to permit handling it comfortably; of course, there is the less danger of cracking of tools, and the grinding speed can be increased safely. Some of the disadvantages in wet grinding could be that the operator's view is sometimes obscured when a full supply of coolant is employed. Also, this great amount of coolant may be thrown on the operator by splashing, and the temperature rise in the carbide tip evaporates the coolant rapidly causing a quenching action which might crack the tip unless the work is completely flooded at all times.

### Marking of cutters

On each cutter body the serial number of the cutter should be stamped. Furthermore, a card providing the history of each cutter should be placed

corner angle, clearance angle, grade of carbide, and land or face edge. The Cincinnati Milling Machine Company has drawn up a carbide cutter card that might come in handy for those shops wanting to keep a record of individual cutters. Note chart. Such information will both serve to identify the cutter and to instruct the grinder operator in the rake angle setting each time the tool is sent to the tool room for re-grinding.

Store the cutter in a box for further protection. Sometimes it helps to give the cutter, or at least the carbide tips, a coating of plastic by dipping. In this manner a skintight, tough protective film is formed over the tooth surfaces that can be easily peeled off when the tool is ready for use. Many cutters are broken through negligence in transporting them from the toolroom to the shop.

### Applying the fluids

Of course the circulating method, or pump method, is the most common and effective of the various ways of getting the coolant to the wheel and tool tip. This generally consists of a pump to circulate the grinding fluid in sufficient volume and under sufficient pressure to keep the work flooded at all times. There is generally a settling tank also. A variation of this may be used with diamond wheels where the work is ground on the side of the wheels. A small stream, then, is pumped into the recessed side of the wheel and caused to flow over the grinding face by centrifugal action. This permits better ob-

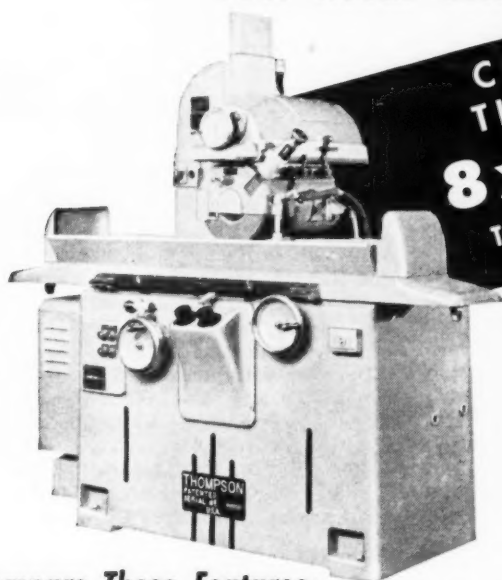
CARBIDE CUTTER CARD									
Serial No.					Tool No.				
Cutter Type					Teeth		Make		
Diameter		Hand			Bore				
Corner Angle		Axial Rake			Radial Rake				
Body Thickness		Body Mat'l			Tip Size				
Grade of Carbide									
Chamfer									
Land or Face Edge									
Face Angle									
Face Relief									
Peripheral Clearance									
Tips Replaced									
Tips Reset									
Grinding Time (Hrs.)									
Date Ground									
Grind	1	2	3	4	5	6	7	8	9 10

#### • Cutter grinding record

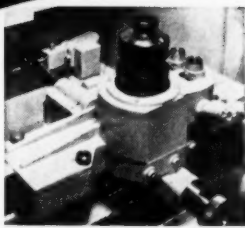
in the box. Some of the information listed might include the date of each grind, the axial and radial rate angles,

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servation of the work while it is being ground.

In coolants the grinding fluids commonly called coolants have several functions in addition to cooling the work and the wheel face. Effective grinding fluids will also lubricate the cut, wash away chips and keep corrosion from attacking. The best coolant for taking heat away is plain water but this has no lubricant effect and tends to rust both the machine and parts. Thin oils have good lubricating properties but do not cool nearly as well as water. Soluble oils mixed with water are very effective as coolants. They protect the work as well as machines from corrosion and have some lubricating effect too. When used in too highly concentrated solutions they might gum up the face of the grinding wheel and slow up the cut. This is especially true when soluble oils are used with diamond wheels. Soda ash solutions are effective coolants and keep the face of the wheel quite clean. They should not be used in high concentration solutions with resinoid bonds. Alkali attacks resinoid and tends to soften the bond. There are many chemical compounds, manufactured and sold under different trade names, that when mixed with water are very effective in cleaning and keeping clean the face of the grinding wheel. They are not too alkaline and do not affect the wheel bond if used according to directions.

### **Insufficient diamond supply**

Because of the great rate of increase in carbide tools it has been predicted that all big production jobs will have to be tooled for carbides within five years in order to meet competition. The continuing need for conserving the limited supply of diamond bort available for the manufacture of diamond wheels is obvious.

Limited quantity of new diamond coming into the country is not sufficient

to meet the present requirements, both civilian and defense, for diamond wheels. However, authorities believe if the greatest possible life and production are extracted from diamond wheels by using them to their maximum efficiency and only when necessary, the available supply might be able to meet the needs.

While there has been some improvement in the diamond situation and deliveries of diamond wheels have been vastly improved in many instances, the problem is still critical. Because of the inevitable increased demand for diamond bort, strict conservation and salvaging of diamonds from used wheels and swarf is still imperative.

### **New methods tried**

The industry is on the lookout at all times for new ways of grinding carbide tools without the use of diamond wheels and hones. Some substitute methods have already been developed but most of them are not too satisfactory or still in an experimental stage.

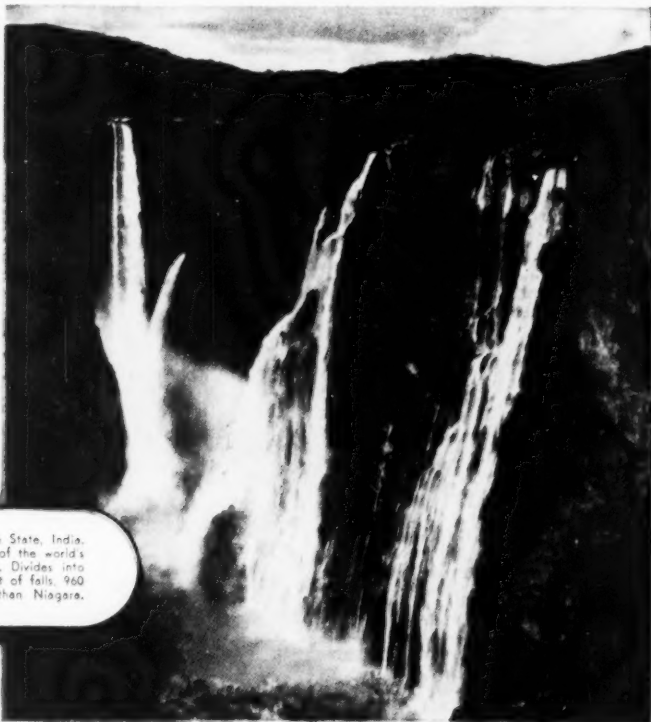
Such methods as electro-arcing, electrolytic action, and electro-sparking have been tried with considerable success. (See MACHINE and TOOL BLUE BOOK, December, 1952, page 219, "New Grinding and Machining Processes Promise Conservation of Diamonds".)

### **Abrasive belt**

One method that is coming into some use (see MACHINE and TOOL BLUE BOOK, February 1953, page 179, "Abrasive Belts Cut Carbide Sharpening Costs") is a low cost coated abrasive belt used on equipment especially designed to meet the exacting requirements of carbide tool grinding. This consists of a combination of a special abrasive-coated belt and an ingenious fixture on an abrasive belt machine. This is said to enable an operator to finish grind the primary relief land, generally 1/32" to 1/16" wide, below the cutting edge of the carbide tip tool to the precise angle desired in a matter of seconds. The tool is prepared for



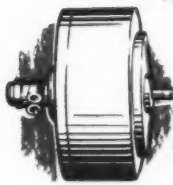
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Rotating Air Cylinder

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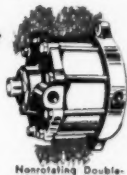
Standard sizes from 1 1/2" to 16" bore; maximum stroke, 18 feet. Special models to meet your requirements.

Logan Features—Larger Ports . . . More Sturdy Construction . . . Maximum Power Without Leakage . . . Permanent Seal Around Piston Rod . . . Standard Models With or Without Cushioning.

### ROTATING

Two Standard Styles—Type R with cast iron body; Type K with lightweight aluminum body.

Bore diameter 1 1/2" to 20"; piston stroke 1" to 2"; longer strokes available as special. American Standard adaptations.



Nonrotating Double-Acting Air Cylinder

Consult Logan for your special heavy-duty, mill-type cylinder requirements

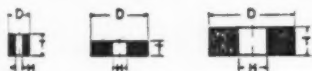
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AIR and HYDRAULIC PRESSES, Cat. 51, COLLET GRIP TUBE FITTINGS, Cat. 200-5, HYDRAULIC CONTROL VALVES, Cat. 200-4  
HYDRAULIC CYLINDERS, Cat. 200-2; 200-3, HYDRAULIC POWER UNITS, Cat. 200-1, SURE-FLOW COOLANT PUMPS, Cat. 42

LOGAN MANUFACTURING COMPANY, INC., 1001 WEST CENTER AVE., LANSING, MICH.

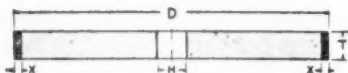
## Standard types of diamond wheels



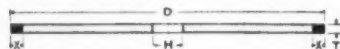
**TYPE D1S**  
Resinoid Bonded  
Vitrified Bonded



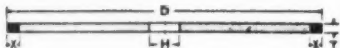
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Vitrified Bonded



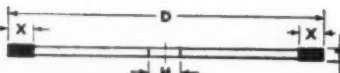
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Metal Bonded  
Vitrified Bonded



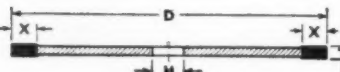
**TYPE D1C**  
Metal Bonded



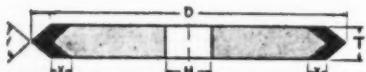
**TYPE D1CR**  
Metal Bonded



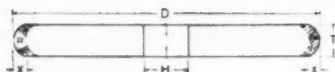
**TYPE D1CRS**  
Metal Bonded



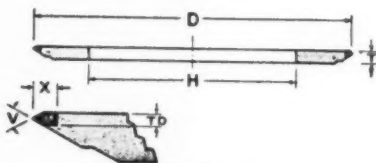
**TYPE D1TEE**  
Resinoid Bonded



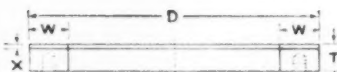
**TYPE D1TFF**  
Resinoid Bonded



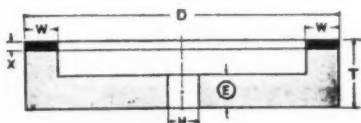
**TYPE D1TM**  
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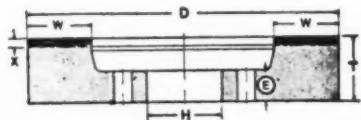
**TYPE D2W**  
Resinoid Bonded  
Metal Bonded



**TYPE D6W**  
Resinoid Bonded  
Metal Bonded  
Vitrified Bonded

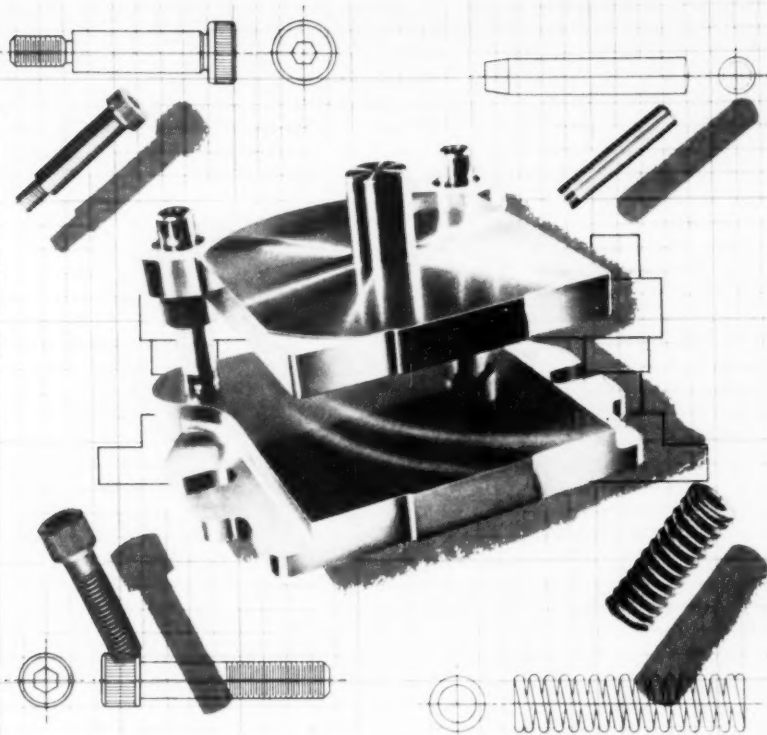


**TYPE D6WH**  
Resinoid Bonded  
Vitrified Bonded



**TYPE D6WHC**  
Resinoid Bonded  
Metal Bonded  
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In nearly every instance, Danly can meet your diemaking specifications with *standard* Danly Die Sets and *standard* Danly Die-makers' Supplies. Eliminate delay between design and production... you can be sure of prompt delivery from completely stocked Danly branch assembly plants located in major tool-making centers.

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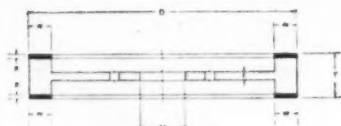
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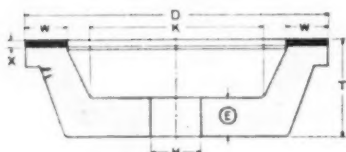
Chicago 30, Illinois

DIE SETS AND DIEMAKERS' SUPPLIES

# Standard diamond wheel types (continued)



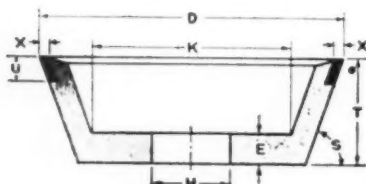
**TYPE D9W**  
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Metal Bonded  
Vitrified Bonded



**TYPE D11W**  
Resinoid Bonded  
Metal Bonded  
Vitrified Bonded



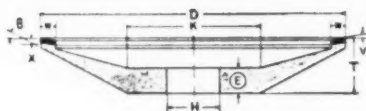
**TYPE D11WVI**  
Resinoid Bonded



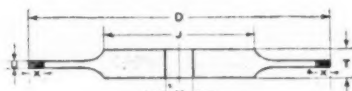
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Resinoid Bonded  
Vitrified Bonded



**TYPE D12W**  
Resinoid Bonded



**TYPE D12WVI**  
Resinoid Bonded



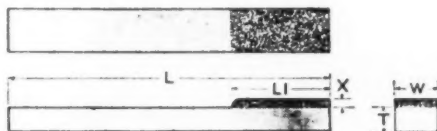
**TYPE D14U**  
Resinoid Bonded



**TYPE D15W**  
Resinoid Bonded



**TYPE D15WVI**  
Resinoid Bonded

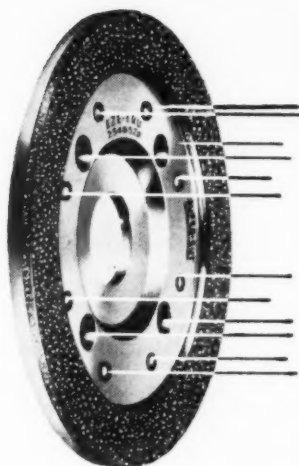


**TYPE DH1**  
Resinoid Bonded  
Vitrified Bonded



**TYPE DH2**  
Resinoid Bonded  
Vitrified Bonded

# You can align **this** ..... **Diamond Wheel Quickly!**



**New, patented  
EZE-true feature  
on Super-Cut  
Wheels save time  
and diamonds  
assures better  
finishes . . .**

## **Every Carbide tool grinding shop needs this!**

This patented EZE-TRU Diamond Wheel eliminates need for shimming up low spots when back plates are out of alignment. Has eight auxiliary tapped openings fitted with small screws. Selective tensioning of these screws against back plate quickly and easily brings wheel into true alignment. This insures accurate wheel installations which grind faster, give better finishes and prolong wheel life.

**Send for Price List and full details . . .**

*This EZE-TRU feature can be supplied on 6", 7" and 10" diameter, shallow or plain cup type wheels. For prices and full details, write to:*

**SUPER-CUT**  
**DISTRIBUTORS, INC.**

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Super-Cut Distributors, Inc.  
3418 N. Knox Ave., Chicago 41, Ill. BB-5  
Gentlemen:  
Please send me full information and prices on  
your line of EZE-TRU Diamond Wheels

Name \_\_\_\_\_  
Firm \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

micro finishing by first rough grinding, usually on a 60 grit silicon carbide wheel. Only a few passes, as a rule, across the 4" wide silicon carbide abrasive belt are then required for grinding the narrow, primary relief land. Finishes on tools thus ground are reported to be superior in many cases. In preparation for this micro-finish grind, to the desired primary relief angle, all such tools should first be rough ground at a few degrees greater secondary relief angle. This method is said to eliminate the use of diamond wheels and hones entirely.

### Plunge cut

Another method, called PLC or "plunge cut" has been introduced (see MACHINE and TOOL BLUE BOOK, January 1953, page 202, "Savings Claimed for New Carbide Grinding Procedure"). This is said to increase diamond wheel life considerably and enable a feed of one second per inch per .001" depth of cut for carbides.

Briefly, the new treatment calls for: abundant flow of coolant, predetermined cutting depth of infeed and downfeed; wheel brought in contact

with work while former is in motion, in the conventional fast pass method; work fed while in the opposite direction from the direction of the wheel, never in the same direction—in other words, conventional milling, not climb milling; wheel not forced through work, but fed at a pace just below a point where the wheel begins to labor. The regular procedure is to take light cuts at relatively fast passes. Down feeds should seldom exceed .00025", chip breaking not over .001", and tool and cutter grinding not over .0005"; nevertheless, these figures are surpassed at times.

### References:

- The Norton Co., Worcester 6, Mass.
- The Grinding Wheel Institute, Greendale, Mass.
- Behr-Manning, Troy, N. Y.
- The Carborandum Co., Niagara Falls, N. Y.
- Warner and Swasey Co., Cleveland, Ohio
- Cincinnati Milling Machine Co., Cincinnati, Ohio
- Ingersoll Milling Machine Co., Rockford, Ill.
- R. K. LeBlond Machine Tool Co., Cincinnati, Ohio
- Edward Blake Co., West Newton, Mass.
- Royal Oak Tool & Mach. Co., Royal Oak, Mich.
- Detroit Reamer & Tool Co., Detroit, Mich.

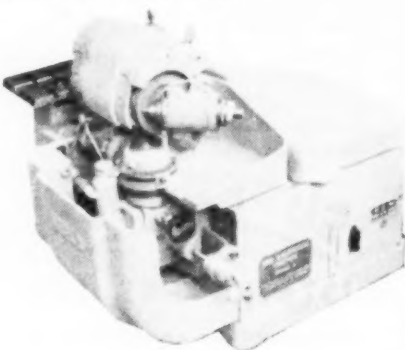
## Descriptions of late model tool and cutter grinders

### Heald tool sharpening machine

On this model 2 tool sharpening machine, made by The Heald Machine Co., Worcester, Mass., tools are sharpened automatically, making it possible to easily and quickly duplicate tools of the desired shape. Adjustments for radius, front and side angles, etc., can be quickly and accurately made, using graduated scales. The operator then inserts the tools, flicks a switch and the tool is sharpened automatically.

A fine-grit diamond wheel is used. Provision is also made for adding an extra wheel and attachments at the left end for grinding large, flat or shaped

tools, or for roughing tools before finish grinding on the right.



### **Gallmeyer & Livingston universal cutter and tool grinders**

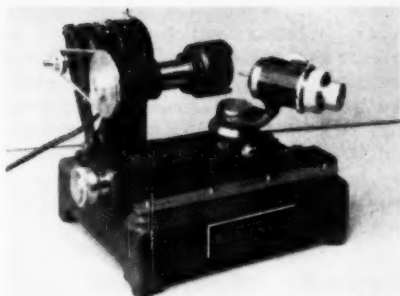
On these machines, made by Gallmeyer & Livingston Co., Grand Rapids 2, Mich., provision is made for operation of longitudinal, transverse and vertical movements from any necessary



position. Antifriction table is standard equipment; subtable ways on the base are carefully guarded. The design of the machine provides for raising and lowering the grinding wheel head and also for the cross feeding of the head and column so that the position of subtable and table remain fixed insofar as either vertical or transverse movement is concerned. Machines are equipped with greased-for-life precision ball bearing cartridge type spindle requiring no lubrication for the life of the bearings.

### **Mico cutter grinder**

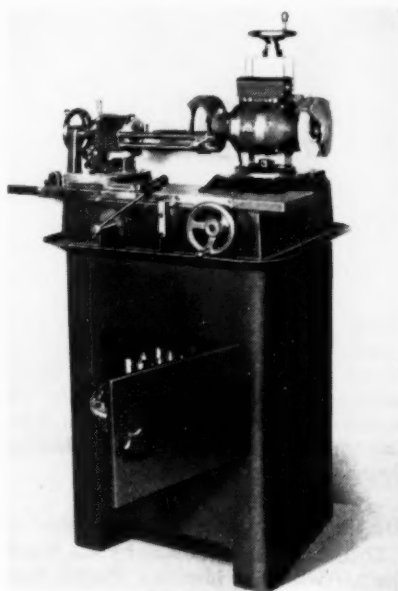
This improved machine, made by Mico Instrument Co., Cambridge 38, Mass., is a carefully designed portable grinding machine having wide applications. The new feature of a separate grinding wheel spindle assembly permits the use of pre-loaded ball bearings that are shielded and greased for long life. This feature, instead of having the grinding



wheel mounted directly to the motor shaft, eliminates vibration as well as relieves the motor bearings of an added variable load.

### **Radial relief grinder**

This grinder, made by the D-S Grinder Div., Royal Oak Tool and Machine Co., Royal Oak, Mich., removes a minimum of stock behind the cutting edge, giving a stronger tool and resulting in better tool life and better finish.

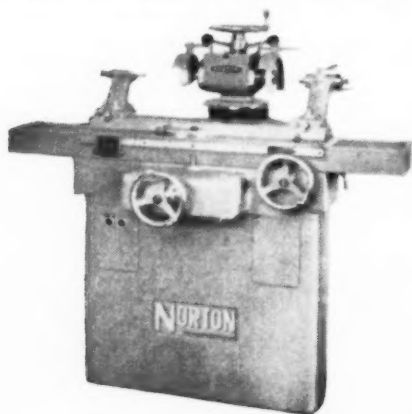




The spindle is mounted on pre-loaded, super precision ball bearings and is ground in the assembled state to assure accuracy and concentricity. Bearings are sealed against abrasive dust. Fixture can be adjusted to give straight radial relief or a combination of radial and helical relief. Cams and index plates are available for grinding tools having from 1 to 16 flutes.

#### **Norton No. 20 cutter and tool grinder**

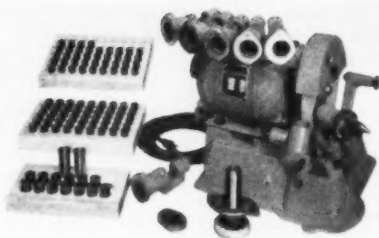
This is a hand operated, antifriction bearing table machine that offers extreme versatility due to its tilting head feature. Wheel head tilts 15° either side of zero in a vertical plane; it may be swiveled 360° in a horizontal plane. Other features are: integral motor carriage type spindle; duplicate controls



which permit, with equal convenience, operation from the front or either side of the machine. A wide variety of attachments is available to enable the machine to handle many special jobs. This machine is made by the Norton Company, Worcester 6, Mass.

#### **Black Diamond drill grinder**

This drill grinder, made by the Black Diamond Saw & Machine Works, Inc.,



Natick, Mass., holds the drill in a fixed position, grinds the drill lips exactly the same length, at the correct angle, and with proper clearance. The grinder will sharpen small wire gage and fractional drills without complicated attachments or adjustments. The grinding wheel is of the dry cutting, cup-type and is dressed, when necessary, by means of a diamond permanently set in a swinging lever, a device that automatically assures correctly dressed wheel for accurate grinding.

#### **B & S No. 10N**

The No. 10N cutter and tool grinding machine with universal equipment, made by the Brown & Sharpe Mfg. Co., Providence, R.I., is designed specifically



*Announcing the New*

# **WERNER # 5 and # 6 VERTICAL MILLERS**

Forty two spindle speeds from 16  
RPM to 1600 RPM

Fifty table feeds from 9/32" to 80"  
per minute

No. 5 table 20"x90"

No. 6 table 20"x110"

Table travel 55", with manual or  
fully automatic rise and fall cycle

Preselector for spindle speeds and  
table feeds.

Feeds may be changed while cutting.

Footproof table clamps open auto-  
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Converts instantly from a tool room  
miller to an automatic production  
machine.

**40 horsepower  
(50 h.p. opt.)**



**MANY MORE NEW  
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FEATURES**

**PROMPT AND  
REASONABLE  
DELIVERIES**

**PLAIN No. 5 AND  
No. 6 MILLERS  
ALSO AVAILABLE**

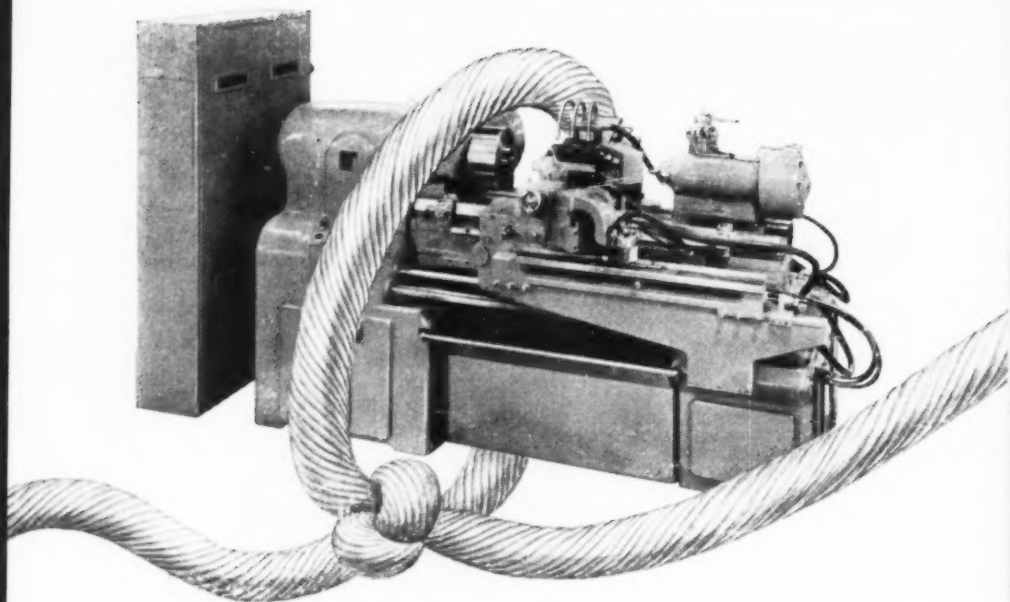
Inquiries are invited  
about smaller Werner  
Millers, sizes 0 to 4 with  
tables from 6"x20" up to 16"x72"



**FOR FURTHER INFORMATION WRITE, WIRE, PHONE**

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# 90% SAVINGS..

**Here it is** in a nutshell, fresh from the Monarch Mona-Matic installation at the Sargent Engineering Corporation of Huntington Park, California. The part is a fork 6" x 2" OD, made from a 4130 chrome-moly

forging heat treated to a hardness of 125,000-145,000 psi before machining—"a tough machining problem from the beginning." Now, look what happened to the production time when the Mona-Matic went to work:

THEN		OPERATION	NOW
Turret Lathe	30 min.	Rough Cut	} Mona-Matic 5 min.
Engine Lathe	10 min.	Semi-Finish Cut	
Grinder	10 min.	Finish	
3 Machines	50 min.		1 Machine 5 min.

**That makes a 90% reduction** in machining time alone, and it's just the start! Set-up time for the job has shrunk from more than 3 hrs. to less than 20 min. One machine has replaced three. Only one operator is required (and he could easily handle two Mona-Matics if necessary). Add all that up—and is there anything

more that we have to add to it?

What is this machine that consistently turns out production savings like this on short runs and long ones alike? That's where the string on the story comes in! Aren't you convinced that you'd better return our handy coupon right now? . . . *The Monarch Machine Tool Co., Sidney, Ohio.*

THE

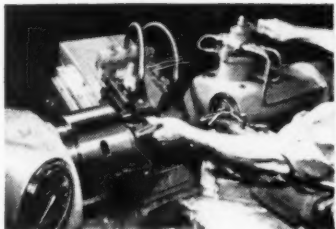
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NAME.

COMP

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**THE MONARCH MONA-MATIC** (Main Illustration and Above, with Work Piece). This is a new and outstandingly successful approach to production metal turning. Use of a single tracer-controlled running tool speeds production, slashes tool costs, tool change time and set-up time, increases accuracy, and slashes time required for subsequent grinding operations. Available with magazine load.

• with a String Attached!



**FOR A GOOD TURN FASTER... TURN TO MONARCH**

**THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio**

Gentlemen: I am interested in your Mona-Matic story and would like to receive your illustrated Booklet, with complete data and job performance reports. Please send me your Booklet 1804 without obligation.

NAME \_\_\_\_\_ TITLE \_\_\_\_\_

COMPANY \_\_\_\_\_

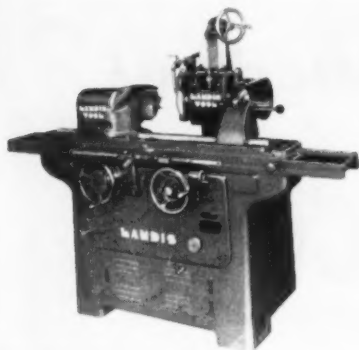
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for sharpening all types of milling cutters, straight or tapered reamers, saws, etc. The fixed height of the machine gives easy visibility of wheel and work from operating positions. Controls are sensitive and easily operated. Unit type double-ended antifriction wheel spindle (super precision, permanently sealed, grease-lubricated bearings) can be swiveled in a horizontal plane. Mounting of sliding table on arrangement of precision-ground steel rollers gives exceptionally easy table movement.

### **Landis universal and cutter grinder**

Model 12" x 28", made by Landis Tool Co., Waynesboro, Pa., features continuously variable adjustable speed head-stock drive which permits adjustment for maximum output without interrupting the grinding cycle. By dynamic balancing of rotating parts any unbal-



ance is located and corrected. Since the causes of vibration are eliminated, smoother, finer finishes are assured. Super-precision pre-loaded ball bearings for both spindle and face plate are used.

### **Blake tap chamfer grinder**

Because of positive mechanical controls this machine grinds uniform relief on the chamfer of each land. Machine



consists of a base on which are mounted a motor head unit and work head unit. Work head is mounted on a slide actuated by a feed screw for easy adjustment for various length taps. Work head unit rocks on a bar in the base plate slide and is connected by a special adjustable eccentric mechanism with the crankshaft spindle. Taps may be inserted or removed from the machine in a few seconds. A simple locating device assures correct positioning and duplication of the work. Change gears are furnished for grinding taps with 2, 3, 4, 5, 6, 8, or 10 flutes. Machine is made by Edward Blake Co., West Newton 65, Mass.

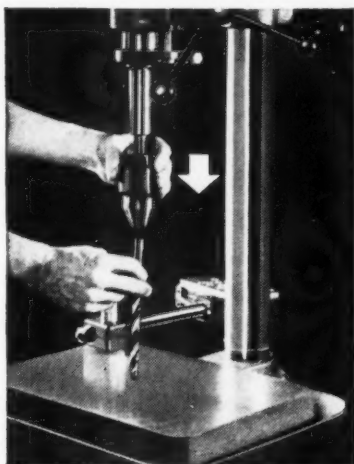
The Black Diamond Drill Grinder is distributed by Edward Blake Co., West Newton 65, Mass.

### **Waltham cutter sharpener**

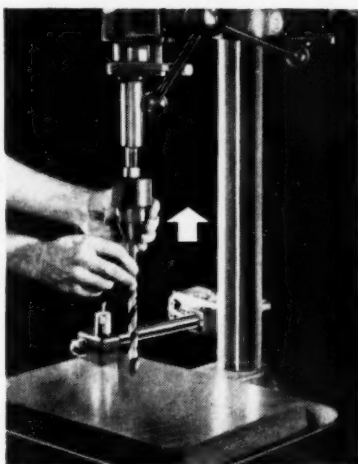
This sharpener can be used for sharpening cutters such as those used for gear cutting and thread milling, circular form tools, straight fluted hobs, and multiple cutters up to 3" in diameter and  $\frac{3}{4}$ " thick. Machine consists of an adjustable wheel head unit and a work head unit mounted on a rocker bar. This allows the work head to be swung to and from the wheel during the sharpening operation. When the work head is pulled toward the operator it is in an ideal location for loading, indexing, or unloading. In order that cutters of various sizes may be kept in line radially with the diameter of the

# Change tools *in seconds* with this **FULLY-AUTOMATIC CHUCK**

no keys . . . collets . . . or wrenches



**SPINDLE  
NEVER  
STOPS**



## HERE'S ALL THERE IS TO CHANGING TOOLS

**TO OPEN**—Grip Sleeve—pull down—jaws open automatically—tool is released.

**TO CLOSE**—Insert new tool—push up tapered part—tool is locked in place.

**SAVE TIME**—Change tools with spindle running . . . no keys, collets or wrenches needed. Ideal for fast, uninterrupted production.

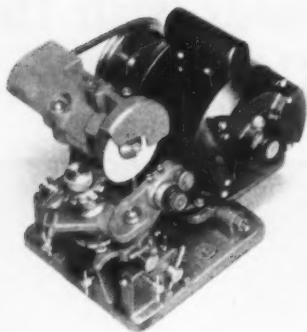
**SAVE MONEY**—One spindle does the work of several. Smooth, hardened, ground jaws grip tight without chewing tools. Grip increases with load.

**IDEAL FOR**—Precision drilling or for spotting, drilling and reaming in boring or milling machines; in lathe work for burring, turning and filing.

*Available in two capacity ranges,  
1/64" to 3/8" and 1/32" to 1/2".*

Order from **your local industrial supply distributor** or write for illustrated folder to:  
Wahlstrom/Float-Lock Sales Dept., American Machine & Foundry Co., 511 Fifth Ave., New York 17, N. Y.





wheel, the wheel head may be raised or lowered. The Waltham cutter sharpener is distributed by Edward Blake Company, West Newton 65, Mass.

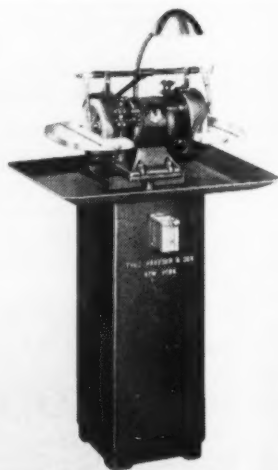
#### **Ex-Cell-O 44-A precision carbide tool grinder**

This precision finishing grinder uses a standard 6 inch plate mounted face wheels. It sharpens sintered carbides, cast alloys and hss. It's suitable for grinding carbides with diamond wheels. Style 44-A is a double-end model with wheel spindle driven by a balanced inbuilt motor. Spindle shaft is carried in precision ball bearing. Spindle is

permanently lubricated. Reversible motor permits grinding left and right hand tools on the same wheel, also makes it possible for two people to sharpen tools at the same time. Cool cutting action is assured by a generous volume of coolant supplied from the direct motor-driven pump. Tool rest tables are U-shaped and easily tilted to the exact angle required. Tables may be moved out when new wheels are installed; may be moved in as required to compensate for wheel wear.

#### **Prosser model AW**

This model, made by Thomas Prosser & Son, 120 Wall St., New York City, embodies all of the features of the regular model AA machine, including the quick acting indexing tables which can be instantly and exactly set to the required angle, and which "stay put" without locking screws. Machine is provided with a separate motor-driven coolant pump, pan, settling tank, piping, valves, nozzles, spray guards, and delivers a copious flow of water directly to the tool being ground. All types of grinding wheels, diamond wheels, and accessories are available for the model.

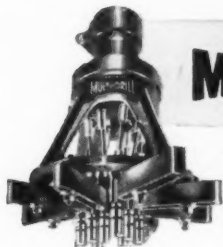




# Commander PRODUCTION TOOLS

## SPEED PRODUCTION...

## LOWER COSTS



### Adjustable MULTI-DRILL

- Adjustable To Any Hole Pattern
- Drill 2 to 8 Holes at 1 Stroke
- Fits Any Drill Press

Increase production up to 800%—save time, cut costs. Mounted without alterations or special tools. 9" drilling area; centers to  $\frac{1}{2}$ ". Extension Spindles available to increase area to 22 $\frac{1}{2}$ ". Special adaptations available.

"The taper that thinks for its operator"

Adjustable full range torque control instantly stops any tap when it's dull, loaded, strikes a hard spot, or bottoms in blind hole tapping. Assures maximum production, cuts rejects, even with in-experienced operators.



### Commander TAPPER

- Wider Range . . . 1 Tapper Handles No. 0 to  $\frac{3}{4}$ " Taps
- Automatic Tap Protection
- Furnished to Fit Any Drill Press



### DRILL CHIP BREAKER

- Drill SHALLOW or DEEP Holes up to 400% Faster
- Drill 10 diameters or more in depth without clearing drill
- Better, Smoother, More Accurate Holes



Ordinary Chips



Chip Breaker Chips

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## Commander MFG. CO.

4219 W. KINZIE STREET • CHICAGO 24, ILLINOIS

### **Cincinnati No. 2 cutter and tool grinder**

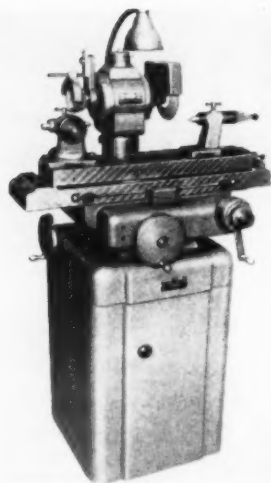
This machine, made by Cincinnati Milling Machine Co., Cincinnati, Ohio, has high versatility, is accurate and easy to operate. Some of the features are: antifriction table slide which traverses with almost zero effort; car-



tridge type preloaded antifriction spindle mounting, lubricated for life; adjustable wheelhead pile, right where the operator wants it. Other features include: duplicate controls for safety and flexibility; centralized lubrication to reduce routine service attention. A wide selection of attachments for sharpening all types of cutters are available: for truing the wheel to radii and angles tangent to radii, micrometer table positioning attachment, coolant system for "mist" grinding sintered carbide cutters.

### **K. O. Lee B800 universal tool and cutter grinder**

The series B800 grinder, made by K. O. Lee Co., Aberdeen, S.D., is available in four models: B800, the basic tool and cutter grinder; B860 universal tool grinder equipped with slide-mounted multiple speed head which makes it possible to perform internal and external grinding operations; B803



chip breaker grinder; B804 universal carbide tool grinder. These new grinders have improved accuracy standards, greater capacities, 25% heavier construction and improved lubrication system, giving longer life. New features simplify and minimize time expenditures in making setups for almost any operation. All shafts are ball bearing mounted. Saddle ways have automatic compensation for wear. The wheel head swivels the full 360° and is calibrated in degrees.

### **Covell universal tool and cutter grinder**

The table of this grinder, made by Covell Mfg. Co., Benton Harbor, Mich., rides on a series of hardened  $\frac{3}{4}$ " balls contained in hardened and ground ways. The base ways are two V's, while the table has one V and one flat way. Fiber retainers separate the balls. The head swings on a vertical adjustable column graduated in degrees.

The precision ball bearing spindle features two sets of paired bearings with spring loading to take up wear and eliminate end play. Bearings are packed




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Single purpose production machines with automatic feeds are cost reducers.

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If It's Worth Marking—Mark It Well.

**GEO. T. SCHMIDT, INC.**

1802 Belle Plaine Avenue  
Chicago 13, Illinois



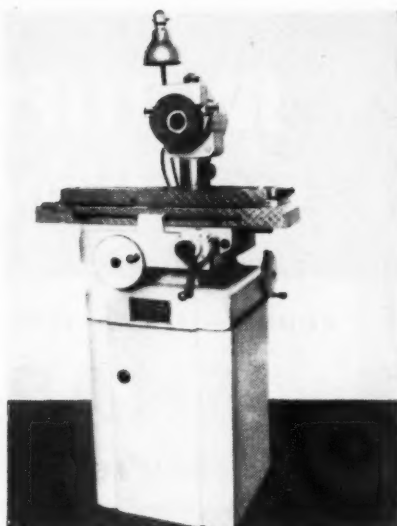


with a special grease confined by seals, assuring sufficient lubrication for the life of the bearings.

The machine is ideal for sharpening all types of milling cutters, reamers, form tools, etc. It may also be used for internal grinding operations.

### The 10" Carboloy tool grinder

This 10" grinder made by Ex-Cell-O Corp. of Detroit and sold by Carboloy, Dept. of Gen. Electric, Detroit, can accommodate all sizes of single point turning, facing and boring tools and is particularly suited for plants having a large number of tools in the medium size range (up to 1" sq.).



The range of angular adjustment of the face grinding table has been increased; graduated scales show the angles; new hand levers make table adjustments easier and new methods of adjustment make tables more rigid.

A guard in the recess of the cup wheel prevents tools from entering the recess and being carried around with the wheel. This is mounted on the table support.

When used in conjunction with the 6" grinder for grinding on diamond wheels, and diamond lapping, these machines provide complete equipment having ample capacity for all reconditioning operations on all sizes of tools.

## Specifications of American built tool and cutter grinders

Mico Instrument Co.			Cambridge, Mass.	
Type and Model	G = Grinding Head GB = Grinding Head Base	Grinding Wheel	Size	Speed
<b>Cutter Grinder</b>	G = Indexed for 3 and 4 surface accuracy GB = from 0° to 90°	1½" dia. x ¼" rim x ¾" hole	10½" long x 8½" high x 8½" wide	7500 r.p.m.

Covel Mfg. Co.		Benton Harbor, Mich.		
Type and Model	S=Swing, dia. SB=Between Right and Left-Hand Tailstock F=Face Mill Capacity	G=Grinding Wheel VS=Vert. Movement of Spindle	T=Table Surface VD=Vert. Dist. Center of Spindle To Top of Table, Max. and Min. LT=Long. Table Travel CS=Cross Movement, Saddle	Horsepower and R.P.M.
<b>Universal Cutter and Tool Grinder</b> No. 6	S=8"; SB=16" F=8" over table, 12" over sub-table	G=6" dia. x 1/2" face; VS=7"	T=4" x 24"; VD=9 3/4"; and 2 3/4"; LT=14"; CS=6 1/2"	1/3 and 1/30 h.p.; 1750 or 1420; 1150 or 1425 r.p.m.
No. 12	S=10 1/2"; SB=24"; F=10" over table 14" over sub-table	G=6" x 1 1/2" face x 1 1/4" or 1/2" hole; VS=8"	T=5 1/2" x 36"; VD=11" and 3"; LT=18"; CS=8"	3/4 and 1/6 h.p.; 1750 or 1425; 1150 or 1425 r.p.m.
No. 22	S=10 1/2"; SB=30"; F=10" over table, 24" over sub-table.	G=8" x 1 1/2" face x 1 1/4" hole; VS=7 1/2"	T=7 1/2" x 42"; VD=13 1/2" and 3 1/4"; LT=24"; CS=8"	do

Landis Tool Co.		Waynesboro, Pa.		
Type and Model	S=Swing MD=Max. Dist. Between Centers MG=Max. Dia. Grind	CT=Carriage Traverse Speed, in./min.	Wheel	Horsepower and Spindle Speed
<b>Universal and Tool Grinder</b> 12" x 28"	S=12 3/4"; MD=28"; MG=12"	CT=12", 23", 43", 85"	10" x 1 1/2" x 1 1/4"	1 h.p.; 2870, 3820, 5730 r.p.m.

Carboloy, Dept. of General Electric Co.		Detroit 32, Mich.		
Type and Model	Capacity	Wheels SC=Silicon carbide D=Diamond	Table	Horsepower and Surface Speed Grinding Wheels
<b>Carbide Tool Grinder</b> 6"	Tools up to 5/8" square	SC=Cup type, 6" x 1 1/2" x 3" D=6" x 3/4" x 1 1/4" (3/4" rim)	7 1/2" x 12"; graduated for 5° above, and 20° below horizontal.	3/8 h.p.; 5000 f.p.m.
10"	Up to 1" square	SC=10" x 2" x 7"	9" x 16"; 5° above, and 30° below horizontal.	1 h.p.; 5000 f.p.m.
14"	All sizes carbide tools	SC=14" x 4" x 11"	9" x 22"; 5° above, 30° below horizontal.	2 h.p.; 5000 f.p.m.
NOTE: All three grinders are made by Ex-Cell-O Corp., Detroit Mich., and sold by Carboloy.				

**Edward Blake Co.**
**West Newton 65, Mass.**

Type and Model	Capacity O=Held on Outside Dia. of Thread, Any Length S=Held on Shanks, Any Length C=Held on Centers	Wheel C=For Chamfer Grinding F=For Flute Polishing	Horsepower and R.P.M.	Remarks
<b>Tap Chamfer Grinder</b> No. 1	O=No. 0- $\frac{1}{2}$ " ; S=No. 0- $\frac{1}{8}$ " ; C=Under 6" long, No. 0-2	C=6" dia. cup x $1\frac{1}{4}$ " face; F=5" dia. $\frac{1}{4}$ " wide	$\frac{1}{4}$ h.p.; 3400 r.p.m.	Available in bench or floor models.
No. 2	O=No. 0- $\frac{1}{2}$ " ; S=No. 0- $\frac{1}{8}$ " ; C=Under 14" long, No. 0-2	do	do	do
<b>Flute Grinder</b>	Capacity: Shank dia.= $\frac{1}{2}$ " ; Tap dia.= $\frac{1}{8}$ "	4" dia.	$\frac{1}{8}$ h.p.; 3450 r.p.m.	—
<b>Waltham Cutter Sharpener</b>	Capacity: Max. dia. of cutter 3" ; Max. thickness of cutter $\frac{1}{8}$ "	Dish (type 12) $3\frac{1}{2}$ " dia. x $\frac{1}{2}$ " thick x $\frac{1}{4}$ " hole	1/6 h.p.	—

**Thomas Prosser & Son**
**New York 5, New York**

Type and Model	Wheel	Size of Base	Horsepower and Spindle Speed	Remarks
<b>Carbide Grinder</b> Model AW Wet Type	7" silicon carbide 6" diamond	12" x 13"	$\frac{1}{2}$ h.p.; 3450 r.p.m.	This model similar to their Model AA. Used for wet grinding.

**Norton Company**
**Worcester 6, Mass.**

Type and Model	Capacity, Work Swung on Centers, Diameter	Length	WS=Wheelhead Swivel WH=Workhead Swivel	Table
<b>Tool and Cutter Grinder</b> No. 1	10"	15 $\frac{1}{4}$ " with universal workhead; 19 $\frac{1}{4}$ " with left-hand footstock.	WS=360° WH=360° horiz., 200° vertical	Swivel table graduations= up to 3" per foot.
No. 2	12"	28" with universal headstock; 31 $\frac{1}{2}$ " with left-hand footstock.	do	Swivel table graduations= up to 2 $\frac{1}{2}$ " per foot.
No. 20	12"	24 $\frac{1}{2}$ " with headstock; 27" with left-hand footstock.	WS=360°; tilt, either side of zero=15°	Table movement, longitudinal=20".
<b>Tool Form Duplicator</b>	2" square	Spindle oscillation, total= $\frac{1}{8}$ " ; rate per minute=115.	Max. pos. back rake=10°	Negative back rake=0° up; positive and negative side rake=0° up

**Brown & Sharpe****Providence, R.I.**

Type and Model	Capacity S=Swing BC=Between Centers CW=Center Wheel to Top of Table	M=Max. Length to be Sharpened MG=Max. Length to be Ground D=Largest Dia. to be Ground	T=Table Size TT=Table Travel CL=Center Line of Work to Center Line of Wheel Spindle	Horsepower and Spindle Speed
<b>Cutter and Tool Grinder</b> No. 5	S=6 $\frac{1}{2}$ "; BC=17 $\frac{1}{2}$ "; CW=6 $\frac{1}{8}$ " max., 1 $\frac{3}{8}$ " min.	—	T=3 $\frac{1}{2}$ "x24 $\frac{3}{4}$ "; TT=6"	$\frac{1}{4}$ h.p.; 8800 r.p.m.
No. 10N with Universal or plain equipment	S=10"; BC=20"; CW=10 $\frac{3}{4}$ " max., 2 $\frac{1}{4}$ " min.	M=11" or 13"; MG=8" or 13"; D=10"	T=5 $\frac{1}{4}$ "x31"; TT=16" or 15" Swivel Table	$\frac{3}{4}$ h.p.; 3000, 3750, 4500 r.p.m.
<b>Universal Tool and Cutter Grinder</b> No. 13	S=8"; BC=24"; CW=12 $\frac{1}{8}$ " max., 3 $\frac{3}{4}$ " min.	MG=15"	TT=22"	1 h.p.; 2730, 3600, 5150 r.p.m.

**Ex-Cell-O Corporation****Detroit 6, Mich.**

Type and Model	Wheels D=Diamond V=Vitrified	Table	Height of Spindle from Floor and Over-all Dimensions	Horsepower and Spindle Speed and Grinding Wheel Surface Speed
<b>Carbide Tool Grinder</b> Style 44-A	D=6"x $\frac{3}{4}$ "x1 $\frac{1}{4}$ "x $\frac{3}{4}$ " rim V=6"x1 $\frac{1}{2}$ "x3" steel back, 1 $\frac{1}{4}$ " hole.	9"x16"; angular adjustment from 30° below horizontal to 5° above; adjustment of 1 $\frac{1}{2}$ " for wheel wear.	46 $\frac{7}{8}$ "; 54"x43"x31 $\frac{3}{4}$ "	$\frac{3}{4}$ h.p.; 3600 r.p.m. 5000 f.p.m.
Styles 46-47	D=6"x $\frac{3}{4}$ "x1 $\frac{1}{4}$ " with $\frac{3}{8}$ " rim, or 6"x $\frac{3}{4}$ "x1 $\frac{1}{4}$ " with $\frac{3}{8}$ " standard; V=6"x1 $\frac{1}{2}$ "x3", 1 $\frac{1}{4}$ " hole.	7 $\frac{1}{2}$ "x12"; 5° above and 20° below horizontal; 1 $\frac{1}{2}$ " for wheel wear.	39"; 45"x27"x18"	$\frac{1}{2}$ h.p.; 3600 r.p.m. 5700 f.p.m.
Style 48-A	V=10"x1 $\frac{1}{2}$ "x2" straight wheel; 10"x2"x2" recessed one side 7" dia. x 2" deep.	9"x16" for face grinding; 6"x6" for periphery grinding; 30° below horizontal, to 5° above, and periphery 30° below horizontal to 10° above; 2" adj. tool rest table.	42 $\frac{1}{2}$ "; 48 $\frac{1}{4}$ "x28 $\frac{1}{2}$ "x18 $\frac{3}{4}$ "	1 h.p.; 1900 r.p.m. 5000 f.p.m.
Style 49	14"x4"x11" bored to 1.250	9" to face of wheel x 22" wide; 5° above to 30° below horizontal; 4" adj. for wheel wear.	42"; 50"x53"x32 $\frac{1}{4}$ " std. dry; 51"x53"x43" wet.	2 h.p.; 1350 r.p.m. 5000 f.p.m.



**K. O. Lee Company****Aberdeen, S. D.**

Type and Model	S= Swing over Table D=Distance Between Centers	Grinding Wheels	Table WS=Table Work Surface ST=Subtable CF=Cross Feed per Rev. V=Vert. Movement of Column	Motor and Speed
<b>Tool and Cutter Grinder</b> Series B800	S=8¼" D=18¾"	Max. size=6" wheel bore=¾" C. L. wheel shaft to top of table=3¾" min., 10½" max.; column to wheel=7¾"; wheelhead swivels 360°	WS=5½"x25¼"; ST=6½"x30¼"; CF=6¾".100" V=6¾".040"	Motors and r.p.m. vary. ¼ or ½ h.p. 3450 to 20,700 r.p.m.

This series of grinders available in four models: B800, basic tool and cutter grinder; B860, universal tool grinder equipped with slide-mounted multiple speed lead; B803, chip breaker grinder; B804, universal carbide tool grinder. All specifications the same. Complete set of attachments available.

**The Cincinnati Milling Machine Company****Cincinnati, Ohio**

Type and Model	Capacity	Range, Workhead	Range, Wheelhead	Horsepower and Speeds
<b>Tool and Cutter Grinder</b> Monoset	Swing over main slide=12" Spindle nose to tail center=6"	Main slide=5¾" Offset slide=2¼"	Vert. slide=4¼" above center; 4½" below center; trans. slide=7½"; long. slide=6"	1/3 and 1/15 h.p. 6000 and 8000 r.p.m.
No. 2 Plain and Universal	Swing over table=10"; Length of work between tailstock centers=27"; between workhead and tailstock=21½"	Longitudinal=16"; cross=8"; vertical (wheelhead)=10½" swivel, 240°	Taper holes in workhead spindle, No. 50 std. and No. 12 B&S or 5 Morse	¾ and 1½ h.p.
Contour	Diameter, 0" to 12"; length, 12"; grinding wheel, 6"x¾"	Longitudinal=3"; cross=4"	Longitudinal=6"; cross=2½"; swivel, 180°	¾ h.p.
Projecto-Form	Magnification 20 to 1 or 40 to 1; area covered by lens, .9"x.837" or .45"x.418"	Range, work platen: long., 4½"; trans., 6"; vert., 1½"	Travel of slide=7¾"; trans. adj. of saddle=4"; vert. adjustment of vert. slide=4"	¾ and 1 h.p.

**Black Diamond Saw & Machine Works, Inc.****Natick, Mass.****Precision Drill Grinders**

Three models available. Each takes 7" cup wheel, ½ h.p. motor. Available in bench or floor sizes. Capacities: No. 1, 2-lipped twist drills, No. 60 to 11/32" fractional; No. 2, 2-lipped, straight shank and No. 1 M.T. shank drills, ¾" to 1½"; No. 3, 2-lipped straight shank and No. 1 and No. 2 M.T. shank drills ¼" to ¾".

Machines are distributed by Ed. Blake Co., 437 Cherry St., West Newton 65, Mass.



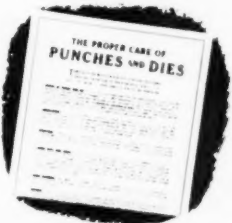
## ***In stock* 400 sizes of 21 standard CLEVELAND PUNCHES!**

For your convenience we carry 400 sizes of our 21 standard punches and matching dies in stock. Punching diameters range from  $\frac{5}{32}$ " to  $1\frac{1}{2}$ ". You will get prompt shipment of any standard punch. Special sizes or shapes will be made to your specifications.

Don't overlook the savings offered by the Cleveland system of standardization. You can punch any size hole from  $\frac{1}{8}$ " to  $1\frac{1}{16}$ " by using the same coupling nut and punch stem.

*Are you obtaining maximum service from your Punches and Dies? Protect tool life—send for copies of our two-color wall instruction chart, "Proper Care of Punches and Dies."*

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**THE CLEVELAND PUNCH & SHEAR WORKS CO. U.S.A.**  
Established 1880

**PUNCHING TOOLS & DIES**

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NEW YORK...CHICAGO  
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**POWER PRESSES**

**FABRICATING TOOLS**

CLEVELAND 14, OHIO

**Gallmeyer & Livingston Co.****Grand Rapids 2, Mich.**

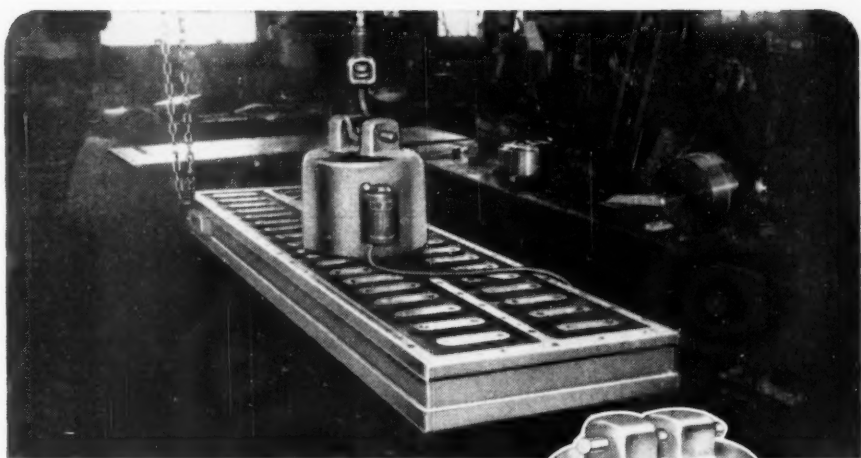
Type and Model	S=Swing SB=Between Right and Left-Hand Tailstock F=Face Mill Capacity MG=Max. Length of Grind	C=Cross Movement of Wheel VS=Vert. Movement of Spindle CL=Center Line of Spindle to Top of Table, Max.	LT=Long. Table Movement TT=Table Traverse per Rev., Handwheel T=Table Size	Horsepower and Spindle Speeds
<b>Universal Tool and Cutter Grinder</b> No. 10	S=10"; SB=22"; F=16"; MG=13½"	C=8" VS=8" CL=10½"	LT=16" TT=2½" T=5"x30"	½ and ¾ h.p.; 3550 and 4800 r.p.m.
No. 12	S=10"; SB=28" F=16"; MG=16"	do	LT=16" TT=2½" T=5"x36"	do
No. 60	S=12"; SB=27" F=16"; MG=16"	C=8" VS=11" CL=13½"	LT=16" TT=½", 3½", 8¼" T=5½"x38"	¾ and 1¼ h.p.; 2850; 3850; 4350; 5800 r.p.m.
No. 62	S=12"; SB=31" F=16"; MG=24"	do	LT=24" TT=½", 3½", 8¼" T=6"x42"	do
No. 70	S=12"; SB=30" F=24"; MG=24"	C=10½" VS=9¼" CL=12¼"	LT=24" TT=½" and 3" T=6"x42"	do
No. 80	S=12"; SB=38" F=24"; MG=32"	do	LT=32" TT=½" and 3" T=6"x50"	do

**Gallmeyer & Livingston Co.****Grand Rapids, Mich.**

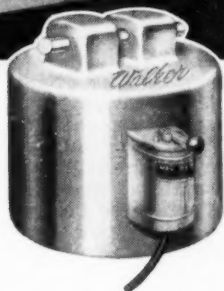
Type and Model	Capacity	D=Dia. of Wheel C=Height to Center of Spindle	Motor and Spindle Speed
<b>Drill Grinder</b> Model CWA	No. 52 to 2½" drills.	D=12" C=44"	1½ h.p.; 1750 r.p.m.
	Company makes 7 other models. All specifications the same except capacity. Model DWA=No. 52 to 4". Model CWT=¼" to 2½". Model DWT=¼" to 4". Model BWT=¼" to 1½". Model CDT=¼" to 2½". Model BDT=¼" to 1½". Model ADT=No. 52 to ¾".		
<b>Tap Grinder</b>	Same specifications as drill grinders except capacity: Model 2D1=No. 6 to 3" taps; Model 2DT=¾" to 3" taps; Model TD1=No. 6 to 1½" plug taps; will also grind nut and taper taps up to 1½", where length of taper is not over 1½".		
<b>Combination Drill and Tap Grinder</b>	Same specifications as drill sharpeners except capacity: Model AD1=No. 52 to ¾" drills, and No. 6 to 1½" taps; Model BD1=¼" to 1½" drills, and No. 6 to 1½" taps; Model BD2=¼" to 1½" drills, and ¾" to 3" taps; Model CD2=¼" to 2½" drills and ¾" to 3" taps.		

**The Heald Machine Co.****Worcester, Mass.**

Type and Model	Front Clearance Angle	R=Radius Adjustment O=Off-Center Adjustment	Swing of Tool Holder	Wheel Speed
<b>Tool Sharpening</b> Model 2	-10° to +30°	R=0° to 2¼" O=5/16"	150°	5000 r.p.m.



**Pound for pound, volume  
for volume, this is the  
strongest magnet made**



**WALKER MAGNETS**—The utilization of magnetic force under the most efficient conditions is the outcome of Walker's more than fifty years of research and development. . . . The 12" diameter Walker lifting magnet shown holds work up to 3000 pounds. The Walker material is high in permeability and magnetized to complete saturation with equal flux distribution. . . . The Walker line includes contoured lifting magnets increasing the area of contact for special applications (for wire, pipe, etc.)

**O. S. WALKER CO. Inc.**

**WORCESTER 6, MASSACHUSETTS**

D-S Grinder Division, Royal Oak Tool and Machine Co.				Royal Oak, Mich.
Type and Model	CC=Max. Collet Capacity MD=Dia. Between Centers	GC=Grinder Unit Cross Travel GV=Grinder Unit Vert. Travel	TS=Table Size TT=Table Travel	Remarks
<b>Radial Relief Grinder</b> Floor Model	CC=1 $\frac{1}{4}$ " MD=3 $\frac{3}{4}$ "	GC=5 $\frac{1}{4}$ "; GV=5 $\frac{1}{4}$ "	TS=8 $\frac{5}{8}$ "x23 $\frac{7}{8}$ "; TT=12 $\frac{3}{4}$ "	Fixture also available in motorized model.

### Die forge casting machine by Lewis Welding & Eng. Corp.

Development of a new die forge casting machine which is claimed to make possible new economies in casting production was announced recently by James T. Lewis, Jr., president of Lewis Welding & Eng. Corp., Dept. BB, Bedford, Ohio.

This machine employs the so-called "cold-chamber" method of injection, but introduces a new principle of injection which provides for rapid fill while the metal is molten, and unusually high final squeezing pressure.

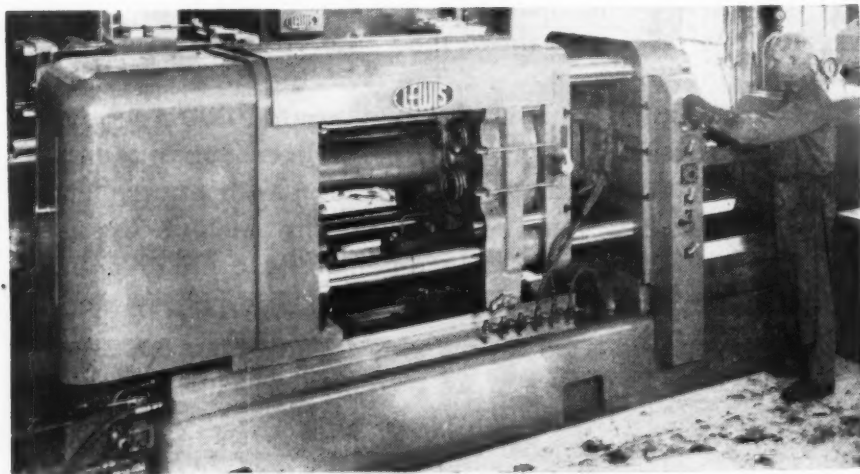
This prevents shrinkage voids as the metal freezes and excessive porosity due to air and gases being trapped in the dies.

In addition to a new principle of injection, the machine features a new method of clamping the dies together, known as the "Hydra-Lock," which de-

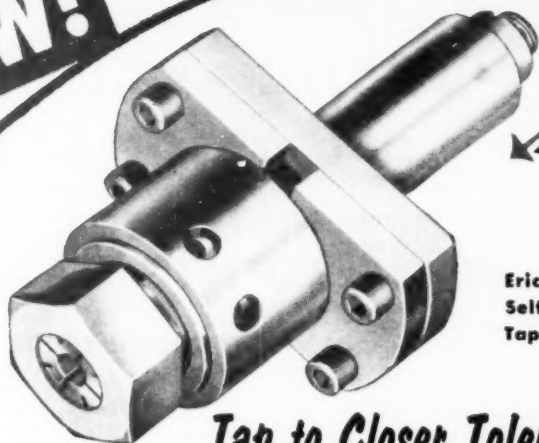
velops a final clamping pressure of 650 tons.

The clamping mechanism of the machine embodies three principal elements. A small hydraulic cylinder advances the platen, on which the moving half of the die is mounted, to a position wherein the die faces are open only a fraction of an inch. A mechanical locking device holds the platen in the closed position. Incorporated in the platen structure is a 28" diameter hydraulic cylinder, actuated automatically through the control circuits, which does the final closing of the dies and supplies the final locking pressures.

The stroke of this large cylinder is so short that only a fraction of a gallon of oil and a few tenths of a second's time are required for this part of the clamping cycle.



**NOW!**



**Erickson  
Self-Releasing  
Tap Holder**

## *Tap to Closer Tolerances at High Production Speeds...*

With this member of the famous family of Erickson Precision Holding Tools, you can now produce any class fit at truly record breaking rates.

Review your present tapping operations. Learn how they can be improved by the Erickson Tap Holder's special features:

- 1. Self-Releasing:** Positive, simplified releasing mechanism speeds production, prevents tap abuse.
- 2. Corrects Misalignment:** Adjustable to correct spindle errors; extends useful life of machine.
- 3. Positive Drive:** No interference with alignment. Same principle as used in Erickson's famous Tap Chucks.
- 4. Full Grip:** Erickson collet grips along its entire length.
- 5. Maximum Tool Life:** Corrected alignment assures even cutting on all flutes; cleaner threads; longer tap life.
- 6. Increased Speeds:** Superior alignment and control of cutting operation safely permit stepped-up speeds.

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A-5415

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# YOU CUT—

- **FASTER** • **CLEANER**
- **and at Lower Cost**

## STONE HIGH-SPEED CUTTING MACHINERY

### —LOOK AT THESE TYPICAL CUTTING TIMES—

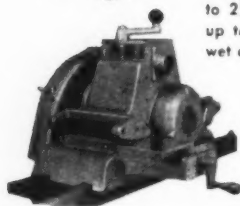
COLD ROLLED	1" Dia. Rod	3 Seconds
COLD ROLLED	1½" Dia. Rod	6 Seconds
COLD ROLLED	2½" Dia. Rod	15 Seconds
PIPE	2" Dia. Rod	3 Seconds
ANGLE IRON	2"x2"x¼"	3 Seconds
ALUMINUM	2" Dia. Tube	3 Seconds
BRASS	1"x1" Bar	4 Seconds

**CUT ALL METALS AT LESS THAN  
4 SECONDS PER SQUARE INCH**



**MODEL M-75**

A floor model, 2½' x 4' equipped with full 7½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2½" — pipe and structurals up to 4". Can be equipped for wet cutting.



**MODEL SS-20**

Operates on guided rails for cutting larger structural steel, plate, sheet, with cuts up to nine feet in length. Cuts wet or dry.

**MODEL M-14**

32" x 34" Bench Model. This mighty little brute, with full 3½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2" — pipe and structurals up to 2½". Two models — straight cut-off and swivel head for angle cutting to 45°. Legs available.



For complete information write to  
**STONE MACHINERY Co., Inc.**  
 404 Fayette St. Manlius, N. Y.



# MCCROSKY

**COST  
CUTTING  
TOOLS**

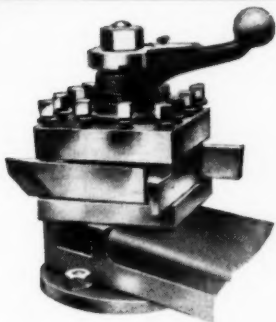
## *Turret*

### **TOOL POSTS**

give engine lathes the advantages of turret lathes

- The successive tools needed for multiple operation jobs can be swung into cutting position quickly — indexed accurately in any of 12 indexing positions — and locked rigidly when you use a McCrosky Turret Tool Post, giving engine lathes the advantages of specialized machines.

5 styles, including square and hexagon designs — 9 sizes — for mount-



ing in the T-slot of the compound rest, or the bolt circle of the main slide. Used by leading concerns. Endorsed by all well known lathe manufacturers. Send for Bulletin No. 17-T.

#### **MCCROSKY Universal MILLING CUTTERS**

Body can rotate either right or left hand. Consequently, selecting blades with tips of proper material mounted at proper angles produces a cutter that meets any requirement. Write for Bulletin 531.



#### **MCCROSKY Jack-Lock<sup>®</sup> MILLING CUTTERS**

Complete line, fitted with high speed steel, cast alloy or carbide tipped blades. Sizes from 3" to 24" to meet any requirement. Write for Bul. 17-M.



#### **MCCROSKY Super<sup>®</sup> Adjustable REAMERS**

Chuckling reamers with straight or tapered shanks, also shell reamers with tapered holes or large straight holes. Standard sizes from 15 16" to 6" in diameter. Write for Bulletin 18-R today.



#### **MCCROSKY Block Type BORING BARS**

Individually ground, tapered V-key centers the block and cutting blades accurately and rigidly yet permits easy release for regrounding. Write for Bul. 17-B.



#### **MCCROSKY Wizard<sup>®</sup> QUICK-CHANGE CHUCKS**

McCrosky's Wizard Quick-Change Chuck and Collet outfits hold tools centered and rigid. They enable the operator to change tools without stopping or slowing down the spindle. Write for Bulletin 18-C today.



#### **MCCROSKY Multiple Operation TOOLS**

McCrosky "Specials" combine two or more boring, facing, chamfering or reaming operations into a single tool, cutting set-up time and costs. Write for Bulletin 17-S today.



**COST  
CUTTING  
TOOLS**

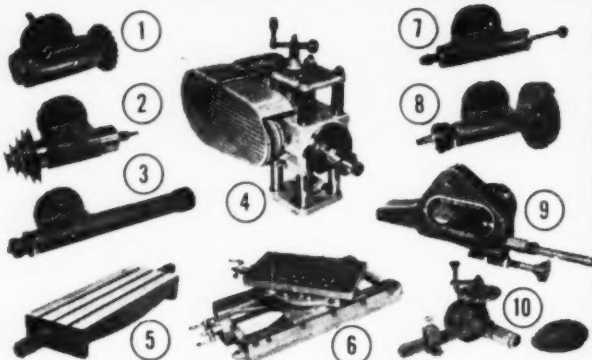
# MCCROSKY

**TOOL  
CORPORATION**  
MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities

# master MACHINE TOOL ATTACHMENTS

for  
**LATHES  
TURRETS  
MILLS**  
OR USE INDEPENDENTLY



- |                                       |                                 |
|---------------------------------------|---------------------------------|
| 1. 90° Universal Milling Head         | 6. Universal Feed Table         |
| 2. Hi-Speed Milling and Drilling Head | 7. Internal Grinder Head        |
| 3. Deep-Hole Internal Grinder Head    | 8. External Grinder Head        |
| 4. Basic Milling Unit                 | 9. Slotting and Keyseating Head |
| 5. Milling and Grinding Table         | 10. Geared Dividing Head        |

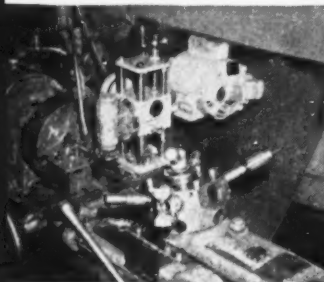
## THREE SIZES

MODEL "C," ½ hp — 9" TO 13" LATHES  
MODEL "B," ½ OR ¾ hp — 13" TO 18" LATHES  
MODEL "M," 1 OR 1½ hp — 18" TO 72" LATHES

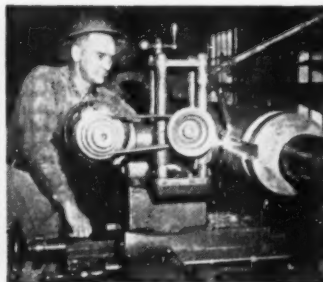
The Master attachment can be used profitably on many production operations. Mount it on your present equipment, lathes, turrets, mills, or use independently to perform additional operations in the same set-up. The basic milling unit with the above types of precision heads gives you facilities for milling, grinding, boring, drilling, indexing, slotting, and keyseating, internal and external. Its full complement of equipment is an **outstanding** value for maintenance, repair, tool room, and

experimental shops, as well as production, thus performs a full range of shop operations at a minimum investment. These improved models are outstanding in rigidity, capacity, and simplicity of set-up and operation and incorporate the latest features developed in our 17 years of manufacturing this tool. Investigate this valuable shop tool. For the cost of one single-purpose machine, you can have several Master units producing. Prompt deliveries.

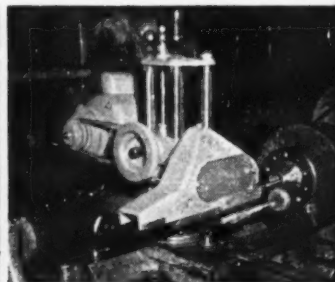
**MAKES LOW-COST INDEPENDENT PRODUCTION SET-UPS — PORTABLE — SELF-POWERED**



Milling on turret lathe completing part in one set-up



End Milling 2½" keyway in 97/8" diameter shaft 22 ft. long



Master Slotting Head on lathe cutting internal taper keyway

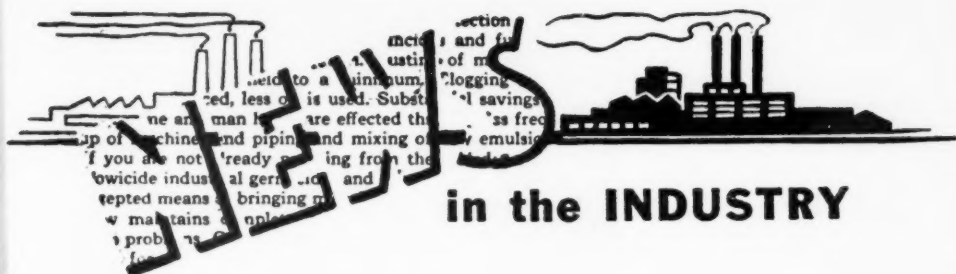
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**MASTER MANUFACTURING CO.**

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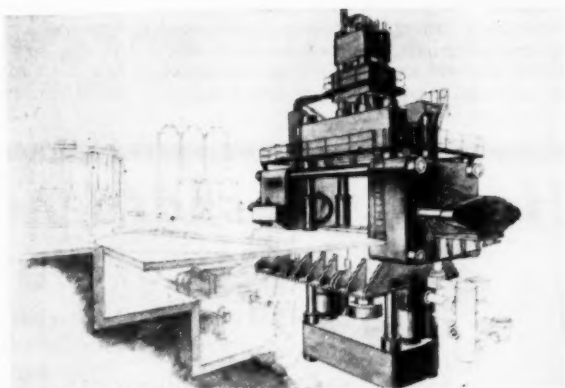




## Baldwin Builds World's Largest Split Die Forging Press

NEARING completion in the Southwark shops of Baldwin-Lima-Hamilton Corp., Philadelphia, Pa., is the largest split die forging press in the world. Upon erection in the plant of Cameron Iron Works, Inc., Houston, Texas, the press will stand as high as a six story building and the supporting foundation will contain a pit 40 ft. deep.

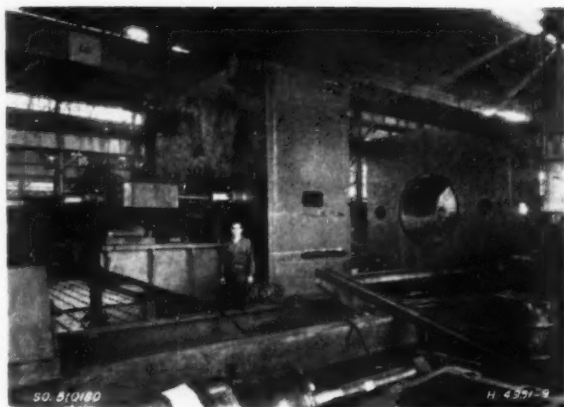
The new pull-down type press, with a capacity of 11,000 tons, will be equipped with a piercing ram at the top and knock-out ram at the bottom, and two horizontal side rams for clamping vertically split dies, or for piercing when using horizontally split dies. Main pull-down capacity of the press will be supplied by two 51" diameter, 60" stroke, single-acting cylinders of 5,500 tons each. Two 18½" cylinders, with a net stripping capacity of 300 tons, will be used as pullbacks. With a bolster area of 10' x 10', the press will have a maximum vertical opening of 12' and maximum horizontal clearance between side-ram faces of 15½'.



The two horizontal side-ram cylinders, each made from a single steel forging, have a capacity of 6000 tons at 8000 p.s.i. Each ram is 48" in diameter with a 24" stroke, and two pullback cylinders on each side have a total capacity of 500 tons.

Top piercing capacity of 3000 tons is furnished by a single 38 in. diameter, 24-in. stroke cylinder. Two pullback cylinders will supply 300 tons net stripping capacity. The piercing ram extension contains a motor driven spindle threaded on its lower end to engage the piercing tool. A double-acting bottom

The two side platens, weighing 400,000 lbs., assembled with horizontal columns for checking and tests. Forged steel cylinder for horizontal ram is in place in the left hand platen. Also in place on the left platen are the pullback crosshead and cylinders. Note size in relation to man.



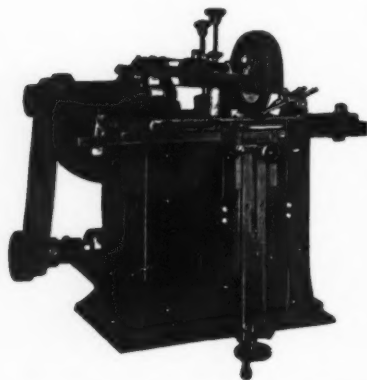
piercing cylinder will have 750 ton piercing and 280 tons pullback capacity.

All of the platens, base, etc., for this mammoth machine were fabricated from steel plate, some of which is 6½" thick. Before welding, it was necessary to preheat the plates with gas torches.

After each part was fabricated complete with bracing plates, column husks, etc., it was placed in Baldwin's heat treating furnace for stress relieving. Some idea of the amount of electric arc welding and time involved to fabricate plates of such thickness can be visualized by the

## Here's the sharpener that triples your saw mileage

### E C Automatic Combination Hack—Band—Circular Saw Grinder



An exclusive feature enables one grinding wheel to sharpen and shape a variety of teeth without changing shape of wheel.

This grinder sharpens and reclaims hack saws that would otherwise be discarded. Instead of one or two sharpenings per saw, you get up to five and six, literally tripling saw usefulness. Write for details.

**WARDWELL MANUFACTURING CO.**  
3165 Fulton Road, Cleveland 9, Ohio



Maker of largest line of  
saw and tool sharpening machines

fact that 64 miles of welding wire went into the job.

Each side platen weighs 200,000 pounds and the base, complete with cheek sections containing the down

stops, weighs 660,000 pounds. Construction of the base in three sections was necessary to keep within permissible shipping dimensions because only three railroad cars capable of carrying such loads are in existence.

## **New Lodge & Shipley administration building**

Built to release much-needed manufacturing space, the new Lodge & Shipley administration building at 3055 Colerain Ave., Cincinnati, Ohio, is a modern example of functional design. Three stories high with an additional section on the roof, the building is of reinforced concrete and two tone masonry with limestone trim.

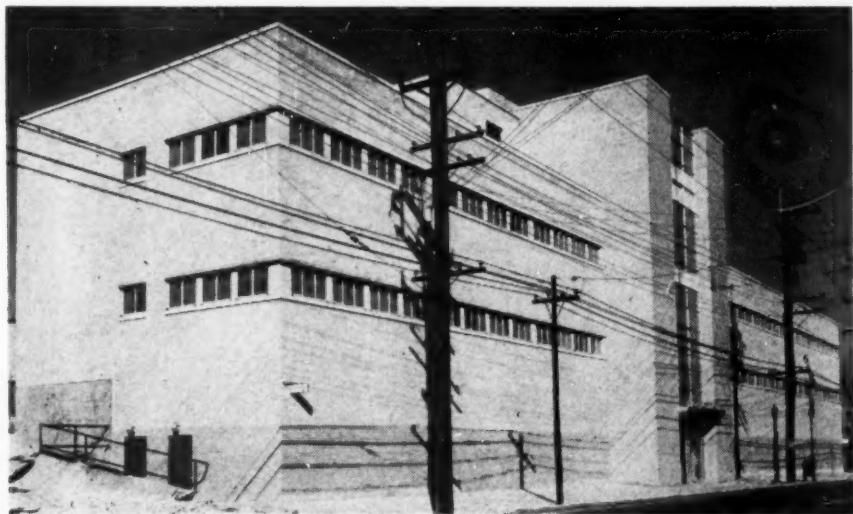
It houses administrative personnel, engineering, tool design, time study and other departments, new employee and executive dining rooms and new sales demonstration facilities. Administration of both the adjoining manufacturing plant and wide-spread sub-contracting operations are handled in the new building.

Construction details include two tone grey exterior walls, dark at the base of the building and the entrance wing and lighter toned brick on the upper

walls. The entrance wing is structural glass to the top of the building. Interior walls are pastel painted concrete block.

Fronting 251 feet on Colerain Ave., the building joins with the manufacturing buildings on a 12 acre plot behind it and contains a total of 33,000 sq. ft. of office floor space. Air conditioning, fluorescent lighting, acoustical ceilings and asphalt tile flooring are used throughout. An automatic passenger elevator serves all floors.

The ground floor has a large employees' cafeteria, personnel offices, medical facilities and the purchasing department. Engineering, production control and methods department offices are on the first floor. Executive and sales offices are on the second floor and the executive dining room in the top floor section.



## Tool engineers elect R. F. Waindle as new president

Roger F. Waindle of Muskegon, Mich., was elected president of the 25,000 member, 105 chapter American Society of Tool Engineers at the 21st annual national meeting of the society at Detroit, after three days of technical and business sessions which saw the presentation of 22 papers by technical experts of the nation.

Waindle, vice president of the Cannon-Muskegon Corp., of Muskegon, Mich., succeeds L. B. Bellamy of Detroit.

Listed below with their new titles are the production experts who have been chosen with Waindle to direct the affairs of the technical society, which includes chapters in the United States

**Seated (left to right):** Joseph P. Crosby, vice president and sales manager The LaPointe Machine Tool Co., Hudson, Mass.; President Roger F. Waindle, vice president, Cannon-Muskegon Corp., Muskegon, Mich.; 2nd Vice President Dr. Harry B. Osborn, Jr., technical director, Tocco Division, The Ohio Crankshaft Co., Cleveland, Ohio; Treasurer Harold E. Collins, manager, process engineering department, Hughes Tool Co., Houston, Tex. **Standing (left to right):** 3rd Vice President Howard C. McMillen, plant manager, Philco Corp., Bedford, Ind.; Executive Secretary Harry E. Conrad; Assistant Secretary-Treasurer Wayne Ewing, partner, Arrowsmith Tool & Die Co., Los Angeles, Calif.; Secretary Raymond C. W. Peterson, owner, Peterson Eng. Co., Toledo, Ohio.





and Canada and members in 11 other countries:

First Vice President Joseph P. Crosby, vice president, The LaPointe Machine Tool Co., Hudson, Mass.; Second Vice President Dr. Harry B. Osborn, Jr., technical director, Tocco Division, The Ohio Crankshaft Co., Cleveland, Ohio; Third Vice President Howard C. McMillen, plant manager, Philco Corp., Bedford, Ind.; Secretary Raymond C. W. Peterson, owner, Peterson Eng. Co., Toledo, Ohio; Treasurer Harold E. Collins, manager, process engineering department, Hughes Tool Co., Houston, Tex.; Assistant Secretary-Treasurer Wayne Ewing, partner, Arrowsmith Tool & Die Co., Los Angeles, Calif.

In addition to electing officers, the society also elected the following men to the Board of Directors:

Willis G. Ehrhardt, partner, Ehrhardt Tool and Machine Co., St. Louis, Missouri; George A. Goodwin, chief process engineer, Master Electric Co., Dayton, Ohio; Ben J. Hazewinkel, president, Daily Grinding, Inc., South Gate, Calif.; Gerald A. Rogers, engineer, Rudel Machinery Co., Ltd., Montreal, Canada; Richard A. Smith, chief tool engineer, Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn.

Waindle, Crosby, Osborn, McMillen, Peterson, and Collins were also elected to the Board of Directors. Bellamy is automatically a member of the board as immediate past president.

The ASTE's new national officers assume their duties at once. The new national directors take office in October.

### **Rochester screw machine conference May 18-22**

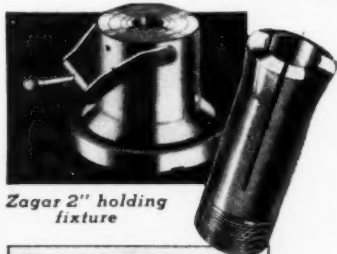
The five day cam design and tool selection conference for single and multiple spindle automatic screw machines will be held at the Rochester Institute of Technology, Rochester 8, N.Y. May 18, 19 and 20 (1/2 day) for the single spindle group and May 20 (1/2 day), 21, and 22 for the multiple spindle group.

Inquiries should be addressed to Robert D. Pease, Rochester Institute of Technology, 65 Plymouth Ave., South, Rochester 8, N.Y.

## **A GOOD MACHINE WORKS BETTER . . . with**

**Zagar**  
COLLET  
**FIXTURES**

- COLLETS
- HOLDING
- INDEXING



*Zagar 2" holding  
fixture*

*Zagar  
5-C  
pull  
type  
collet*



*Zagar 1" indexing fixture*

Help every machine on your floor, new and old, towards accuracy and output with rigid-gripping Zagar holding and indexing fixtures. Since 1937, proven design and thorough craftsmanship have underwritten every investment in Zagar fixtures. Zagar also has a complete line of air-operated holding fixtures and collet lathe chucks.

Write for Engineering Manual "B-5".

**ZAGAR TOOL, Inc., 24000 Lakeland  
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**TOOLS For  
INDUSTRY  
and SPECIAL MACHINERY**



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## SHUR-LOCK ADJUSTABLE ADAPTERS

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**A Precision Built Adapter  
At A New Low Price**



**Made to GMC, Ford and  
Chrysler Standards**

Concentricity	— Max. .002 at end 6" Test Bar
Threads	— Precision Ground (Acme)
Finish	— 6 to 8 Micro
Micro Nut	— Positive Lock Any Position
Woodruff Key	— Relieved Against Swelling
Stock	— All sizes 1/2 - 1 7/8

## SEIBERT & SONS, INC.

CHENOA, ILL.

F. Steele Blackall, III, was recently appointed assistant general manager of the Taft-Peirce Mfg. Co., manufacturers of machinery and tools, of Woonsocket, R.I.

The Pipe Machinery Co., Cleveland, Ohio, announces the appointment of Russel L. Gergen as sales manager of the gage division. Mr. Gergen has been with the company for twelve years.

Stewart E. Wright has been appointed vice president in charge of sales in all



F. S. Blackall



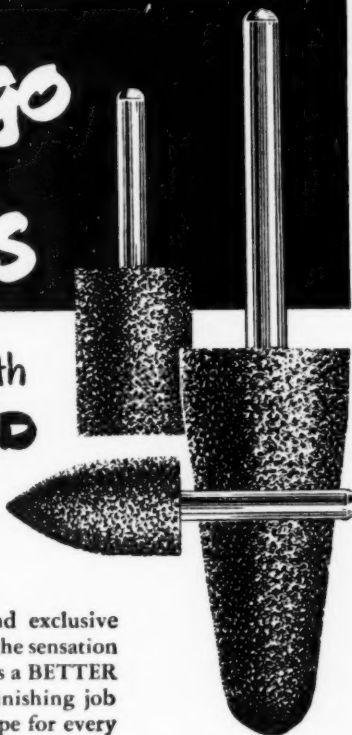
R. L. Gergen

# Chicago MOUNTED Wheels

...NOW  
even better with  
**79E BOND**

Buy Chicago Mounted  
Wheels—bonded with  
**79E Bond**—and you'll  
never use any other!

**79E**—a tough new bond exclusive with Chicago Wheel—is the sensation of the industry . . . it does a **BETTER** grinding, burring, and finishing job **FASTER**. A size and shape for every use. Deliveries are excellent—Order today.



## CHICAGO WHEEL & Mfg. Co.

Dept. MT • 1101 West Monroe Street, Chicago 7

divisions of the Schauer Mfg. Corp., Cincinnati.

The appointment of **Frank W. Jones**, Amelia, Ohio, as general sales manager is announced by **J. R. Stewart**, president of The Bradford Machine Tool Co., Cincinnati, Ohio.

Detroit Stamping Company, Detroit, Michigan, has announced the election of **William H. Roberts** as vice president and secretary, succeeding **John Beck** and **H. G. Roberts**, who have been serving as these respective officers in a semi-active capacity in recent years.



F. W. Jones



W. H. Roberts

# SIGOURNEY

## M-100

### THE PRECISION BENCH DRILLING MACHINE

**ACCURATE** because table and column exactly squared one to the other.

**LONG LIFE** because of hardened and ground spindles.

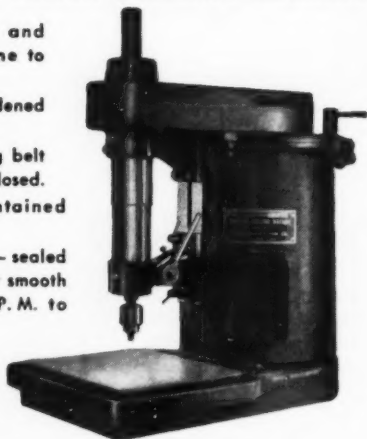
**SAFE** because motor, driving belt and spindles are entirely enclosed.

**STRONG, RIGID** for maintained accuracy.

**SMOOTH AT HIGH SPEEDS** — sealed ball bearings throughout for smooth operation from 4000 R. P. M. to 10,000 R. P. M.

**MODELS** — with 1, 2, 3 and 4 spindles.

Send for illustrated bulletin.



**THE SIGOURNEY TOOL CO.**

Hartford 6, Conn.

Sole Sales Agent

## PRATT & WHITNEY

Division Niles - Bement - Pond Co.

West Hartford, Connecticut

1962

W. F. Rockwell, Jr., president of Rockwell Mfg. Co., 400 N. Lexington, Pittsburgh, 8, Pa., announced the appointment of **E. W. Ristau** as vice president in charge of sales of the power tool division, including the Delta Power Tool line, DeLuxe Saw and Tool Co., and Rockwell Tools, Inc.

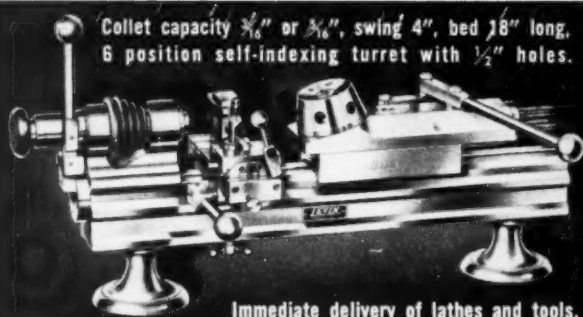
**Francis J. Sohn**, former Detroit district sales engineer for the Clearing Machine Corp., has been appointed vice president in charge of sales of the Sahlin



E. W. Ristau



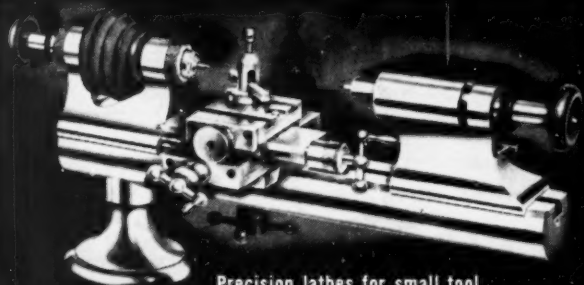
F. J. Sohn



Collet capacity  $\frac{3}{16}$ " or  $\frac{1}{8}$ ", swing 4", bed 18" long,  
6 position self-indexing turret with  $\frac{1}{2}$ " holes.

Immediate delivery of lathes and tools.

**LEVIN**® Jewelers type lathes for fine  
instrument work and second operations. Collets as  
small as .004". Send for catalog. Louis Levin & Son,  
Inc., 782 E. Pico Blvd., Los Angeles 21.



Precision lathes for small tool  
and instrument work. Complete line of accessories.

Eng. Co., designers and manufacturers  
of Iron Hand unloading devices and  
other automation equipment.

Miller Motor Co., 2040 N. Hawthorne  
Ave., Chicago, manufacturer of cylin-  
ders, boosters, and accumulators, an-  
nounced that **H. Bruce Rasmussen** re-  
cently became the Miller sales manager  
in charge of Miller's coast-to-coast sales  
organization.

The responsibilities of **L. A. Dixon**,  
Rockwell executive vice president, have  
just been expanded to include jurisdic-



H. B. Rasmussen



L. A. Dixon

# DURANT

## INVESTIGATE THE DURANT LINE OF PRESS ROOM EQUIPMENT

**INCREASE PRODUCTION! REDUCE COSTS!**

### THE SELECT-O-MATIC ROLL FEED INDEXER

Replace your present roll feed clutch with this DURANT SELECT-O-MATIC multi pawl indexer that accurately controls close feeding due to its 6720 possible stations.

*Write for complete information on our line of economically priced press room equipment*



### ROLL FEEDS

Choose from seven different models that take stock from 2" to 5" wide — Insures accurate feeding — Reversible — Simple to install.

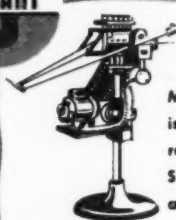


### SCRAP CHOPPERS

Fits all power presses and has simple electrical plug in installation. Low first cost pays for itself — Pennies per day to operate.

### STOCK OILERS

Prolong die life as they clean and lubricate stock in one operation. Variety of models are available. Eliminates hand oiling yet inexpensive.



### STOCK STRAIGHTENERS

Motor driven equipment (shown) is perfect for thin materials. Top rolls are adjustable for thickness. Standard straighteners also available.

*Inquire about our STOCK REELS, FOOT PRESSES, COIL CRADLES, WIRE STRAIGHTENERS, and PRESS FEEDS. Complete free catalog ready now. Write today.*

**DURANT TOOL SUPPLY CO.** 133 ORANGE STREET, PROVIDENCE 3, R. I.

tion over the company's power tool operation, it was announced by **W. F. Rockwell, Jr.**, president, Rockwell Mfg. Co., Pittsburgh, Pa.

Rockwell's Power Tool Operation includes the Delta Power Tool Division, Rockwell Tools, Inc., and the DeLuxe Saw and Tool Co.

Clearing Machine Corp., manufacturer of power presses, recently appointed **Gordon M. Sommers** chief engineer of its Hamilton, Ohio, plant.



**G. M. Sommers**



**M. S. Curtis**



# NEW!



## DIAMOND WHEEL DRESSER

Mounted in fixture that accurately and evenly guides the diamond across abrasive wheel, and at the same time gives the diamond complete support. It eliminates vibration — reduces burning — increases grinding speed, accuracy and finish.

**PRICE** .....\$10.00

*Sold by most leading dealers. If not available, send dealer's name and order to us.*

## HAZERODT ASSOCIATES

416 FORD BLDG.

DETROIT 26, MICHIGAN

Myron S. Curtis, who for the past four and a half years has served as director of engineering of the Warner & Swasey Co., has been elected engineering vice president.

### Jacob D. Cox 1882-1953

Jacob D. Cox, who had been president of The Cleveland Twist Drill Co. from 1919 until last November, when he became chairman of the board, died Feb. 16 at the age of 71.



J. D. Cox

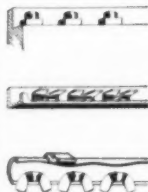


R. K. LeBlond



## Slugs Fed Automatically to Centerless Grinder with *SYNTRON*

### PARTS FEEDERS



Small parts emerge from feeder trough in desired position, one at a time, at variable controlled speeds.

Providing completely automatic, oriented, single file feeding to grinding, packaging, inspecting, and many other automatic machines—Syntron Parts Feeders greatly increase capacities and speeds for production handling of small parts. Economical—compact—easy to install.

Write For Complete  
Catalogue Data—  
Free

**SYNTRON CO.**

300 Lexington Ave.

Homer City, Pa.

Mr. Cox's father founded The Cleveland Twist Drill Co. in 1876 and except for the period 1905-1910 was in active charge of the business until his retirement.

Employee relations occupied much of Mr. Cox's attention. His book, "The Economic Basis of Fair Wages," has been widely quoted. He also pioneered in the installation of one of the first profit-sharing plans in 1915 to implement his belief that the interests of both owners and employees of a business were mutual.

### **R. K. LeBlond 1864-1953**

Richard Knight LeBlond, founder and chairman of the board of The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, passed away quietly at his home recently. He was 88 years old. The pioneer Machine Tool Builder was an active participant in company affairs as chairman up to the time of his illness, when he had completed 66 years as head of the company he founded.



## Clarkson forms U.S. corporation

Clarkson Eng. (Canada) Ltd. has now established a new sales and service office at 320 Ontario Street, Toledo, Ohio, under the name of Clarkson, Inc. A complete stock of the Clarkson products (chucks and milling cutters) will be maintained in Toledo.



## Wickman builds

The Wickman Mfg. Co. announces the completion of their new modern factory located at 10325 Capital Ave., Detroit, Mich.

Standardize on

## hall COLLET CHUCKS

for  
SPEED,  
ACCURACY,  
ECONOMY



Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over. Tremendous grip over or under stock size to .007—without adjustments. All grip...no slip. No bearings...no heat or lost power. Instant release without stopping lathe.

**SATISFACTION GUARANTEED!**

**Made in Two Sizes to Fit Your Requirements:**

Model A...1" (max. capacity 1-1/16")

Model B...2" (max. capacity 2-1/16")

Round, square or hexagon collets, plain or serrated  
**No. 3 Collet Pads Now Available**

Write today for illustrated catalog and price list—Dept. A-5

**HALL MANUFACTURING COMPANY**

422 TULAROSA DRIVE, LOS ANGELES 26, CALIFORNIA

Look to **SID TOOL** for your complete requirements



A.S.A.  
STANDARD

**American  
DRILL JIG  
BUSHINGS**

**In Stock!**

We maintain the largest and most complete stocks of **AMERICAN Drill Jig Bushings** in the East... Hundreds of types and sizes, including specials to your specifications. **IMMEDIATE DELIVERY!** Catalog and prices on request. Let us put you on our monthly mailing list!

**SID TOOL  
COMPANY, INC.**  
CUTTING TOOL  
SPECIALISTS

126 LAFAYETTE ST.  
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BEckman 3-4270

### Lincoln heads firm 39 years

In the spring of 1914 a young man at Ohio State University, nervously waiting for an interview with James F. Lincoln to apply for a job with The Lincoln Electric Co., quickly slipped his fraternity pin from his lapel. He was a fraternity brother of Mr. Lincoln and did not want their fraternity bond to influence the interview in any way.

That young man, A. F. Davis, is now vice president and secretary of The Lincoln Electric Co. and recently had occasion for remembering his first interview with Mr. Lincoln. He slipped another pin on the lapel of Lincoln. At the company's annual banquet, Davis presented to Lincoln a service pin in recognition of Lincoln's

45 years with the company, 39 of which have been as executive head of the organization.



### "De-Sta-Co" expands

Detroit Stamping Co., Detroit, Mich., announces the opening of a new assembly plant devoted to the manufacture and packaging of its nationally distributed line of production work holding tools, "De-Sta-Co" toggle clamps.





**AIR-O-chek  
GUN**


**COMPRESSED AIR  
ECONOMY**

In machine shop and foundry clear away chips, dust, dirt and surplus material quickly . . . AND SAVE through low initial cost, superior performance, low maintenance. Air-O-chek air guns are of simple design, sturdy construction and are easy to use.

**Write for full details**

**AIR-WAY PUMP & EQUIPMENT CO.**  
1054 N. Kilbourn Ave. Chicago 51, Ill.

**Micro**  
*Supreme*  
**LAY-OUT AND  
IDENTIFICATION DYE**



**7 COLORS**

For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheets, strips or parts . . . Shows up in sharp relief—dries instantly . . . Write for sample and circular on company letterhead.

**MICHIGAN CHROME &  
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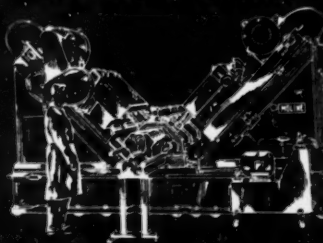


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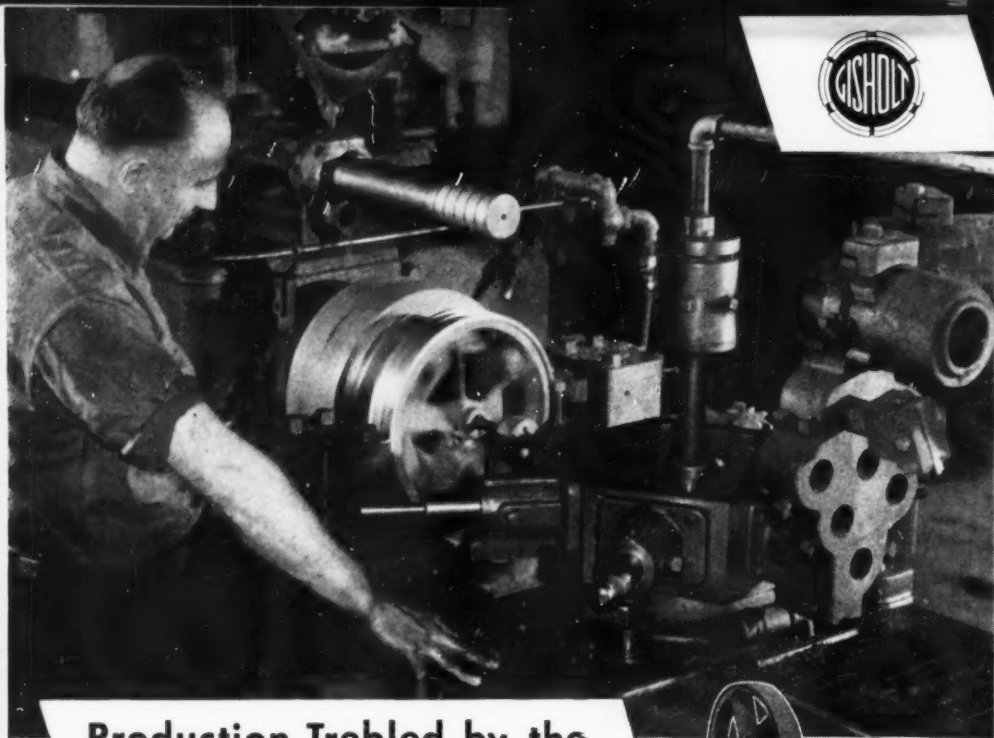
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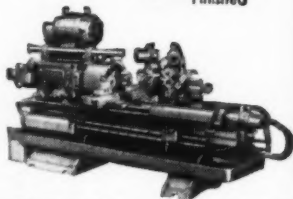
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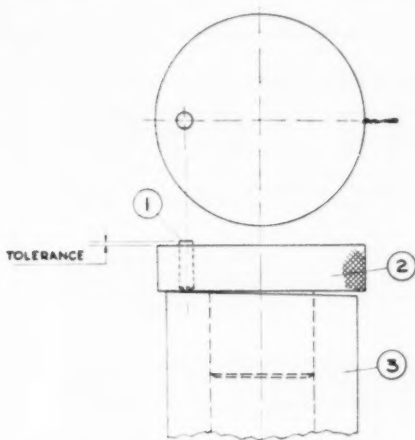
# Shop HINTS



## Simple device checks squareness

by Michael O'Manahan

ENGINEERING specifications sometimes call for a definite squareness tolerance between an accurately finished hole and a neighboring face. It is difficult to use a machinist's square for such a measurement because the leg within the hole must be held straight for an accurate check. Dial indicators, while easily used as long as the work is still on the machine, cannot be used by bench inspection without auxiliary equipment. The simple flush-pin gage, as shown here, can be



used by the machinist as well as by inspection.

A knurled plug (2) is ground to a close slip fit with the inside diameter of the work piece (3). A hole is then drilled and reamed thru the head of plug (2) for a check pin (1). The length of this check pin equals the length of

the plug head plus the total squareness tolerance.

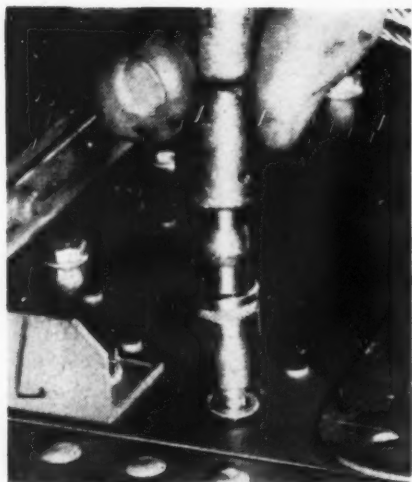
It can be seen from the illustration that, when the plug is rotated, the pin moves in and out of the plug head while the axial position of the plug remains the same. To see if the out of square condition exceeds the tolerance, the operator slides his finger nail over the top of pin (1). If the top surface of this pin is below the top surface of the plug head, the tolerance is exceeded and the part is rejected.

If the hole diameter of the work piece has a tolerance of such magnitude as to allow the plug to rock too much for an accurate reading, it may be necessary to make the plug longer and provide its diameter with several steps, or to make several gages with slightly different plug diameters, or to make a double-ended gage with two different plug diameters, or to make the plug diameter adjustable by addition of some type of expander.

### Adapter for air screwdrivers

An adapter which makes it possible to use  $\frac{3}{8}$ " drive socket wrenches on air screwdrivers is being used at Temco Aircraft Corp., Dallas, Texas, to install spar webs in Lockheed P2V Neptune outer wing panels with an estimated savings of six man hours per panel and at the same time has almost eliminated the need for rework.

Previous to the development of the adapter by J. C. Kyser, a Temco production employee, hundreds of bolts were installed in each panel by means of speed wrenches. Efforts to use air



driven nut runners proved unsuccessful as variations in air pressure often resulted in bolts being driven past the required 100 to 110 lbs. torque. The bolts then had to be removed and new

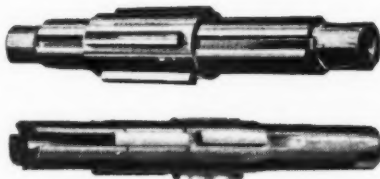
nut plates installed. Attempts to adjust the centrifugal clutches in the nut runners so that they would cut out at approximately 90 lbs. torque proved unsuccessful.

Kyser found that by welding a  $\frac{3}{8}$ " square socket drive to the blade adapter of air screwdrivers, they could be adapted to socket wrenches. The screwdrivers have spring loaded clutches which may be adjusted to cut out at certain torque loadings. Thus it was possible to run the bolts down to approximately 90 lbs. torque and complete the tightening process with a torque wrench.

The relatively low r.p.m. of the air screwdrivers helps the operator to start the bolts in the nut plates properly and their light weight reduces fatigue when they are used over long periods. In addition to their use in the installation of spar webs, new uses are being found for these screwdrivers and adapters throughout Temco's operations.

## Nicholson Expanding Mandrels **SAVE TIME LOST** Providing Solid Arbors

Records in many shops show Nicholson expanding mandrels actually get operations completed in less time than was formerly consumed in providing solid arbors. In cases this results in a tremendous cut in "down" time. Set of 14 Nicholson mandrels replaces 209 solid arbors. For all bores  $\frac{1}{2}$ " to 7"; sold singly or in sets.



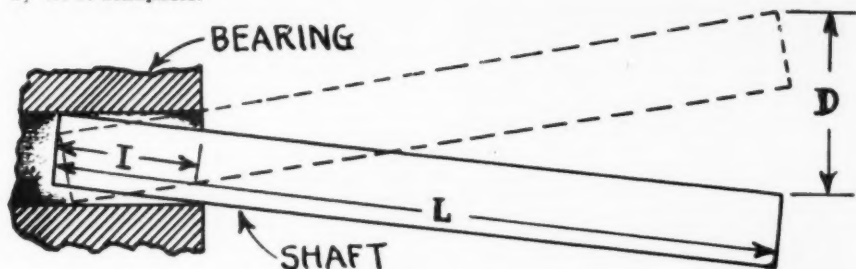
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## How to measure bearing clearance without a micrometer

by W. F. Schopphorst



Every reader doubtless knows that a loose shaft will "wobble" in its bearing. This characteristic may be utilized for determining the amount of clearance between the shaft and its bearing, eliminating the necessity of a micrometer for making fine measurements.

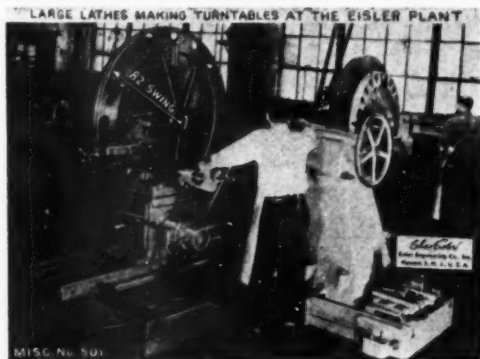
Take the shaft out of the bearing and measure its length "L" in inches. Then shove the shaft part way back

into the bearing, distance "I," called the "distance of insertion."

Now move the end of the shaft from extreme to extreme, calling the movement the "distance of wiggle," "D."

It is obvious that the distance "D" is directly proportional to the clearance. The greater the clearance the greater the distance "D." If there is no clearance

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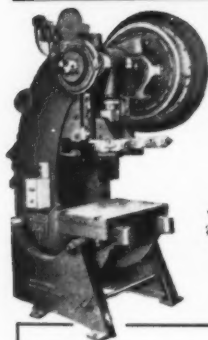
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whatever the end of the shaft cannot be moved. To be sure, if it is a long shaft it can be deflected owing to the elasticity of the shaft. This matter of deflection must of course be taken into consideration if the shaft is long. If the shaft is short and large in diameter deflection can be neglected, and we shall neglect it here.

After making all of the measurements suggested above and as shown in the sketch, multiply the movement distance "D" in inches by the insertion distance "I" in inches and call the product "A." Then multiply the length of the shaft in inches by two and from the product subtract the insertion distance "I" in inches, calling the difference "B." Now divide A by B. The result will be the clearance in inches.

For example, if "D" is  $\frac{1}{4}$ ", "I" is 1" and "L" is 10", application of the above rule tells us that the clearance between the shaft and bearing is 0.01316".

Admittedly, this sketch has been exaggerated purposely to show the principle behind the above method of finding clearance.

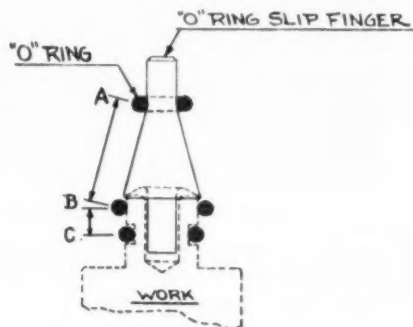
This method is useful also for determining whether or not a bearing is out of round and if so, how much. This is accomplished by measuring the distance "D" in several directions.

## "O" Ring roll finger

by **Henry A. Roy, Sr.**

The "O" ring roll finger is a tool that helps the operator to easily assemble an "O" ring to a part in a second.

Over stretching of the "O" ring or



damaging it is impossible with roll finger.

By placing the roll finger over the work all that is required is to place the "O" ring over the shank of the roll

finger at "A" and with one hand the operator rolls the "O" ring over the taper of the roll finger down to "B".

The "O" ring will easily fall into the groove at "C".

## Orderly barrel storage has many advantages

by H. G. Frommer

The illustrated barrel racks were designed especially for the plant that has various types of oils, greases, cleaners, cutting compounds, etc., in quantity. Proper outside storage must be designed with the following facts in mind:

1. Storage should be in the shade; strong sun expands the contents of the barrels, makes them bulge and occasionally forces some of the contents out. The bulging and deformation may cause loss of deposit paid for the empty barrel.



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## Continental

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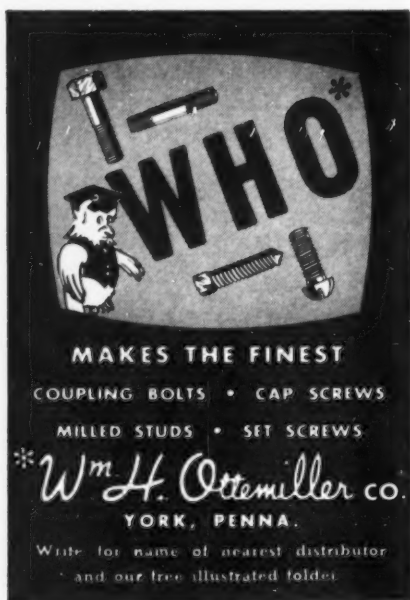
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One machine does both—it sharpens pipe thread chasers at one end—and pipe and tube cut-off wheels at the other end. Keeps your tools ready for instant use—always sharp. *Also, Manufacturers of Cut-Off Machines and Wheels.*

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2. Barrels should be stored horizontally to prevent rain water from collecting on top. If stored vertically, barrel tops rust, which makes the reading of painted identification information impossible. Moreover, excessive rust, too, may cause the loss of the deposit.

3. Barrels should be stored in such a way as to permit selectivity, especially in plants where small inventories are kept.

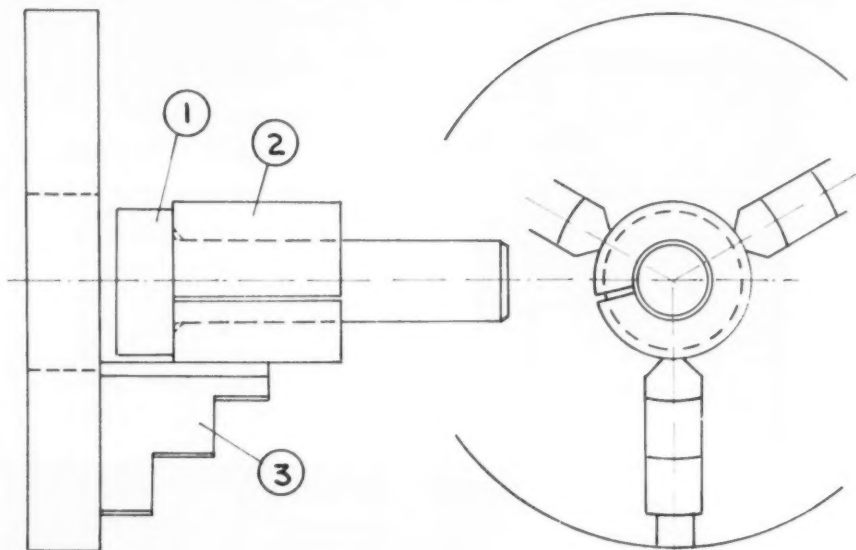
4. Handling time in and out of storage should be kept to a minimum.

With these points in mind, the rack shown here was designed. Standard structural sections and flat bars were used throughout, with seven inch channels as the main support for each barrel. These channels were raised about two inches by use of some short pieces of four-inch channel to allow ample clearance for the forks of the power lift truck. Cross bracing over the entire back side of the rack strengthens the structure and prevents the barrels from being pushed back too far.

### Split sleeve speeds chucking

by Ernest Gruen

Often, the solution for a time-wasting



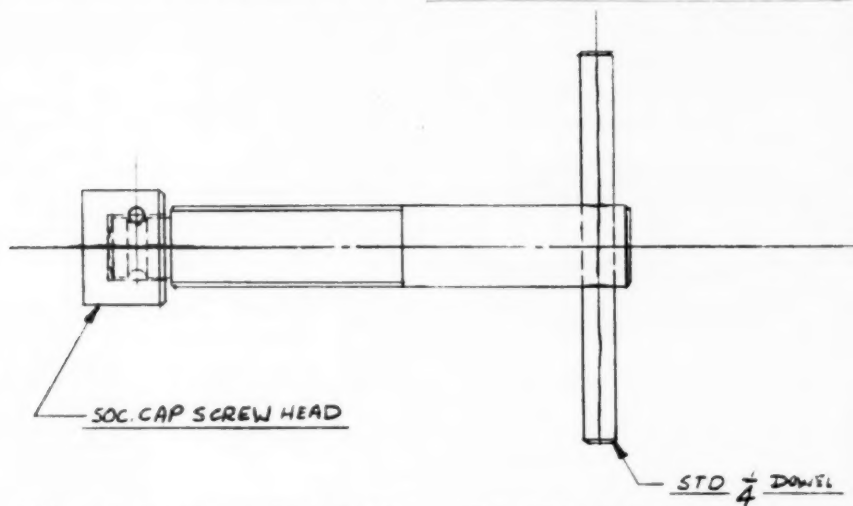
problem is simple and not at all costly. A good example is the chucking of this headed pin (1) that had to be held for a turret lathe operation. To permit gripping of the pin body, the chuck was opened far enough to let the head pass behind the chuck jaws (3) and then closed again.

To eliminate this unproductive and excessive chucking time, a split sleeve (2) was made with an inside diameter slightly larger than the body diameter of the pin and with an outside diameter slightly larger than the head diameter.

This idea saved 85% of the chucking time and paid for the making of the sleeve within a short time.

### Swivel head clamp quickly made from standard screw

Needing a swivel head clamp in a hurry, a toolmaker came up with the clever arrangement illustrated. He took a standard  $\frac{3}{8}$  socket head cap screw and cut the head off. On the thread end of the screw body he turned down a diameter to fit loosely in the hex in the head. Next he reamed a small cross hole in the head for a re-



taining pin. On the opposite end of the screw body he reamed a hole to a press fit for a standard dowel pin which served as a handle.

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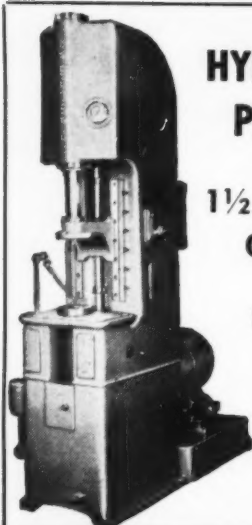
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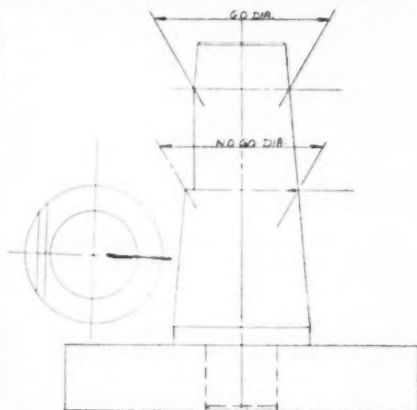
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## Tapered gage for thin stock

Illustrated is a gage that can be used for fast checking the bores on shims, washers and other thin stock. A tapered plug is ground for the high and low limits of the work. Between these two



diameters a flat is ground. This flat will tell the inspector at a glance if the piece is within tolerance.

The other end of the gage is turned down and pressed into a suitable base.

A joint U.S.-Canadian civil defense committee has been set up, and treaty arrangements are being made for across-the-border cooperation. Food supplies, trained personnel and necessary materials will be exchanged in case of attack. Similar discussions have been begun with Mexico.



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Gap 16". Wt. 27 lbs. — **ACCURATE**

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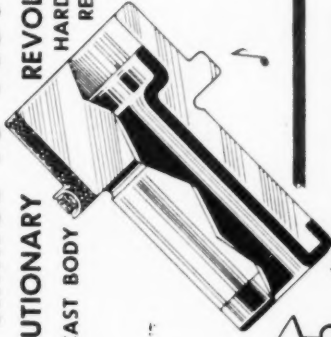
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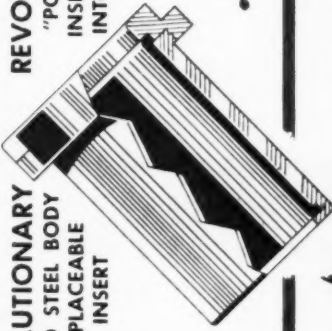
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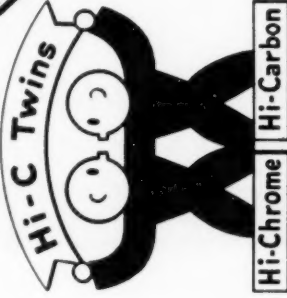
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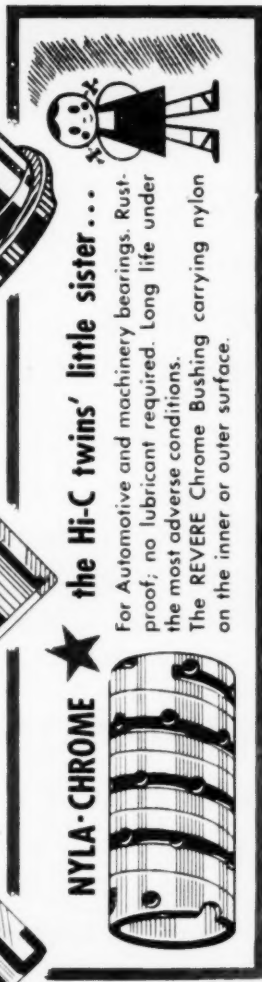
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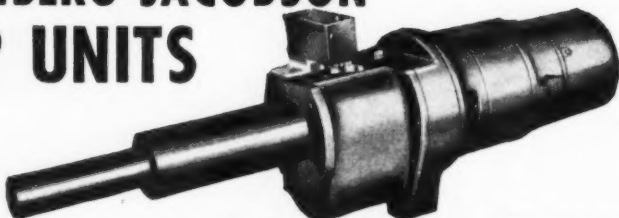


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These units are all available for quick delivery. You can mount them on structures of your own to make practical and efficient production machine tools.

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## MODERN TOOLS

### Abrasive belts in new grinder speed extruded tube production

TWO COATED abrasive belts are the elements of a new centerless grinder that removes two labs. of stock from a 15 ft. length of 2.375 in. o.d. tubing in two minutes. The result of co-operative engineering between Behr-Manning Corp., of Troy, N.Y., and Production Machine Co., of Greenfield, Mass., the new process makes possible a very fast grinding rate of cylindrical stock.

Although this method of grinding is adaptable for fast finishing of cylindrical stock of most materials, it was developed primarily for grinding stain-

less steel and other high alloy tubes produced by the Ugine-Sejournet extrusion process, in which the hot steel billet is forced through a Fiberglas lubricated die. Extruded tubing thus produced must be ground to remove the rough surface that results from the high extrusion pressures, and to remove taper from the cylindrical stock (up to 0.020" per 15' length). Stock removal and not surface condition was the major consideration in finishing the extruded tubing, but 20 to 30 microinch finishes are obtainable using fine grit belts.

1. Cylindrical stock finished with this centerless grinder is controlled and ground by two coated abrasive belts. Designed for finishing tubing produced by the Ugine-Sejournet extrusion process, the machine will remove metal faster than any other method of precision grinding.



**KIPP**  
*Air Grinders*



- **FASTER SPEEDS**
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- **LOW PRICES**

**MODEL JA**  
**50,000 R.P.M.**  
Weight 12 ounces; length 6 3/4 inches; chuck size 1/8 inch. Wheel guard removed for better illustration.

**\$42**  
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## THEY GRIND—NOT JUST RUB!

The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind . . . not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

## MADISON-KIPP CORP.

207 Waubesa St., Madison, Wis., U.S.A.

Write for KIPP Air Tool Catalog at 3006

Tolerances of plus or minus 0.001" taper, end to end, are held.

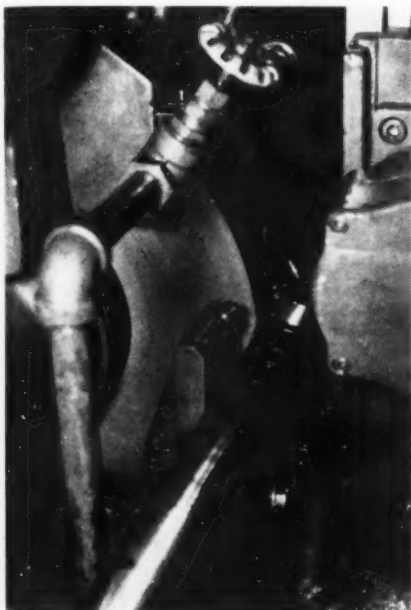
### Uses two abrasive belts

Two coated abrasive belts are used on the machine. A 50 grit aluminum oxide waterproof cloth abrasive belt 9" wide and 168" long does the grinding. The work is fed past the grinding belt by a 220 grit aluminum oxide waterproof cloth abrasive regulator belt 9-3/4" wide and 58" long.

A cutting oil lubricates the grinding belt. Sprayed on the belt by a fan type nozzle, the recirculating lubricant flushes away the grinding swarf and prevents rewelding of the chips.

A steel contact wheel mounted on a 4" shaft supports the grinding belt

2. Tubing moving into the grinding section of the abrasive belt centerless grinder. With the work rest positioned closer to the grinding belt than to the regulator belt, greater belt pressure is exerted on the work by the regulator belt which therefore controls work feed and rotation.

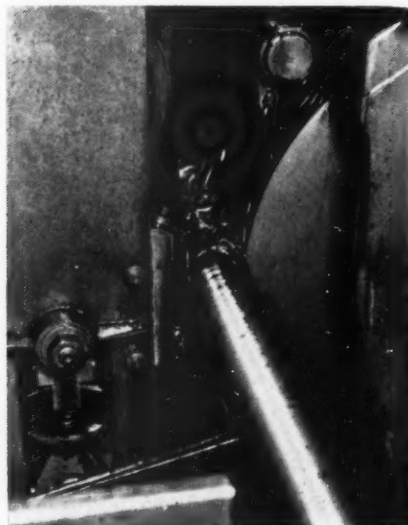


against the work. The use of steel contact wheels is a new concept in grinding with coated abrasive belts. In addition to backing up the belt, the steel wheel serves as the belt drive pulley. Driven by V-belts from a 25 h.p. electric motor, the 20" dia. wheel forces the belt past the work at speeds of 3,500-10,000 s.f.p.m. It is rigidly mounted in ball bearings to prevent deflection under the very high grinding pressures imposed on it. The steel contact wheel weighs approximately 350 lbs.

### Adjustable regulator belt

The regulator belt assembly consists of the coated abrasive belt, a variable speed drive, an idler pulley, and a flat steel back-up platen which holds the regulator against the work. This entire assembly can be adjusted about a horizontal axis to provide a work feed angle

3. Oil flows from the fan type nozzle above the work, onto the abrasive grinding belt. The grinding belt passes over the steel contact wheel at right and the regulator belt passes over the flat platen at left. Distance between the belts can be adjusted for tube sizes from one to six inches in diameter.



May, 1953

## "The American"

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CONDUIT AND HEAVY  
WALL TUBE BENDERS  
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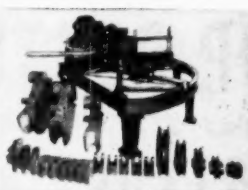
ONE OF 10 HAND-OPERATED TYPES



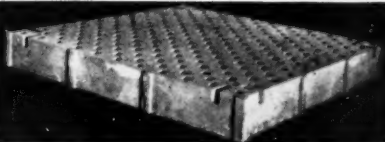
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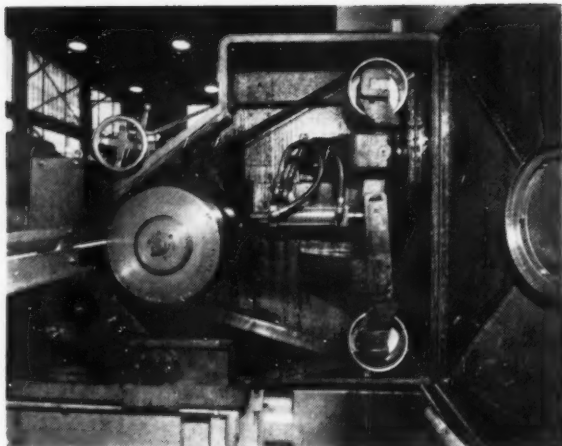


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For hot or cold bends of various shapes, pipes, bars, etc. 5' sq.; 7' sq. (3 1/2' x 7' pairs) suitable for welding together. Other sizes or custom made to your specifications.

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9 Furnace Street, Poultney, Vermont

4. Coated abrasive grinding belt passes over a steel contact wheel (at left) and two idler wheels. The lever mounted idler wheels maintain belt tension. Power to drive the belt is transmitted from a 25 hp motor by multiple V-belt drive to the contact wheel.



of from 0° to 15° in either direction from the vertical. This angular adjustment, together with the variable speed drive, makes possible an infinitely vari-

able work piece feed rate from 0 ft./min. to 30 ft./min.

Use of a coated abrasive regulator belt, operating over a rigid platen,

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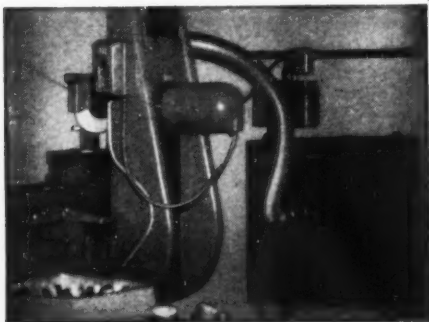
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300 cfm to 10,000 cfm

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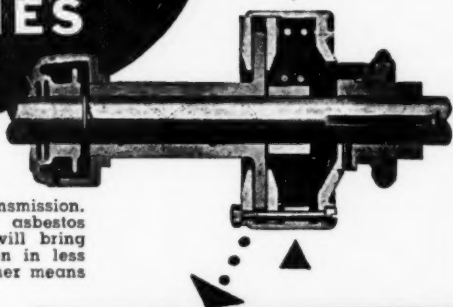
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Regardless of number of stops and starts or initial torque, Brown Mule-Pull Clutches save time, manpower and money, through maximum efficiency in power transmission. Equipped with dry-plate, wire-woven asbestos friction surfaces, Mule-Pull Clutches will bring machinery from standstill to production in less time and repeat it oftener than any other means of control of equal cost.



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offers a decided advantage over rubber bonded regulator wheels, as used in the conventional centerless grinders. The work feed angle of the coated abrasive regulator belt can be changed at will. A rubber bonded regulator wheel, on the other hand, must be reshaped whenever the work feed angle is changed.

The regulator belt, powered by a variable speed drive, controls the rotation of the work against the grinding belt. Control of pressure between work piece and regulator belt is maintained by placing the work rest closer to the grinding belt than to the regulator belt.

The regulator belt is  $\frac{3}{4}$  of an inch wider than the grinding belt. The extra width of the regulator belt is extended on the infeed side of the machine in order to start the work piece rotating before it reaches the grinding belt.

By setting a small taper between the contact wheel spindle and the face

of the back-up platen, a uniform rate of stock removal is maintained across the entire belt width. As a result of the uniform pressure across the face of the belt, dimensional accuracy is assured throughout belt life.

## Grinding results

The main objectives of this method of grinding are: (1) to remove stock from the extruded tubing at a faster rate not obtainable by any other method of grinding; (2) to remove the Fiberglas skin and extrusion die marks; (3) to remove the taper from the tubing; and (4) to provide an acceptable finish on the tubing. Tests have demonstrated that the coated abrasive belt grinding process with cutting oil as a lubricant will accomplish these objectives.

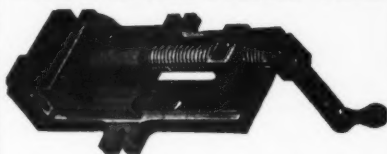
Data compiled by the Behr-Manning products engineering department indicates that the coated abrasive belt grinding process is economically practi-

TUBE NO.	WT. BEFORE GRINDING	WT. AFTER GRINDING	TOTAL WT. LOSS	PASSES	CONDITIONS OF TEST
1	62 lb 10 oz	61 lb 6 oz	1 lb 4 oz	1	<p>(1) Material Ground "Tinkin" 52100 Steel bars 3 in. OD 15 ft Length</p> <p>(2) Machine Production Machine Co. Type 914 Centerless Belt Grinder Contact Wheel -- Steel Feed Angle <math>4\frac{1}{2}</math> Deg. Stock Feed Rate 14.7 FPM Grinding Speed 5100 S.F.F.M. Taper on Platen 0.002 in./in.</p> <p>(3) Results (Averages) Stock Removal Rate lbs. per pass . . . . . 1.1 lbs. per min . . . . . 1.08 Micro-inch finish . . . 20 rms</p>
2	63 lb 12 oz	62 lb 11 oz	1 lb 1 oz	1	
3	64 lb 3 oz	62 lb 4 oz	15 oz	1	
4	63 lb 6 oz	62 lb 6 oz	1 lb	1	
5	61 lb 15 oz	60 lb 7 oz	1 lb 8 oz	2	
6	62 lb 14 oz	61 lb 3 oz	1 lb 11 oz	2	
7	62 lb 9 oz	60 lb 15 oz	1 lb 10 oz	2	
8	62 lb 8 oz	60 lb 11 oz	1 lb 8 oz	2	
9	75 lb 2 oz	61 lb 6 oz	13 lb 12 oz	12	
10	72 lb 13 oz	60 lb 11 oz	12 lb 2 oz	11	
11	74 lb 9 oz	61 lb	13 lb 9 oz	12	
12	76 lb 8 oz	63 lb 1 oz	13 lb 7 oz	11	
Total Figures on one belt					
					63 lb 7 oz and 58 (Total wt. loss) (passes)

5. BELT USED -- 1 lb 50 METALITE (SPEED WET) BEHR-MANNING CORPORATION



## YOST DRILL PRESS VISE



This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

Offered in two sizes.

Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3 1/2	3 1/2	12 1/2
2D	5	5 1/2	23

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cal. The figures on the chart in Fig. 5 show results of a series of test runs made using one belt on 12 bars of Timken 52,100 alloy steel. The belt removed as much stock during the last pass of the twelfth bar as was removed during the first pass of the first bar. Throughout this series of tests, the work feed angle and the work feed rate remained constant.

Because of the rigid construction of the machine and its high ratio of horsepower to belt width (nearly 3 h.p. per inch of belt width) extremely high grinding pressures can be developed. Full advantage is taken of the inherent ability of coated abrasive belts to remove tremendous quantities of stock without overheating the work and causing burning, distortion and loss of dimensional accuracy.

## Now-it-can-be-told story of U.S. Productiveness and the shell that stopped Nazi Tiger tanks

How an urgent "top secret" request from Gen. Eisenhower led to the almost immediate delivery of a revolutionary new antitank shell that stopped the German Tiger tanks at St. Lo and is now in use in Korea was revealed for the first time here recently.

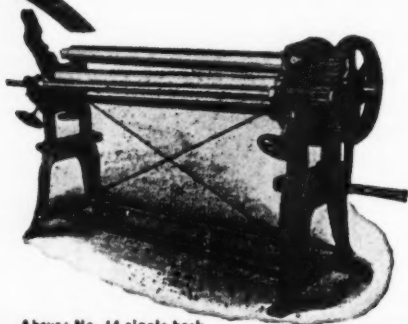
In 1944 the Allied spearhead was being seriously slowed by the new Nazi tanks and their incredibly thick and

impenetrable armor shielding. An anti-tank shell which could penetrate this armor would prevent slowing down or even stopping the Allied invasion. Within two days following the urgent request, the Detroit ordnance district, working in close cooperation with the Carboly Dept. of General Electric Co., had the answer to the German Tiger tank. Firing at even a 20° angle, these

# BELOIT

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Here is a compact, heavy duty Forming Machine which operates to full rated capacity either by hand or by power! The 2 feed rolls, geared together, assure positive feed of even the thinnest material. The third roll is idle but can be made for gear drive at nominal cost. Completed work is easily removed due to a quick acting cam lever device. When lever is released, roll returns and is ready for the next piece of work. Made in bench and floor type models, single and double back.



Above: No. 14 single back geared sliproll, floor model with capacity of 14 ga. 31 other models to meet every need.

Also manufacturers of Punches, Shears, Rod Cutters, Bending and Straightening Rolls.

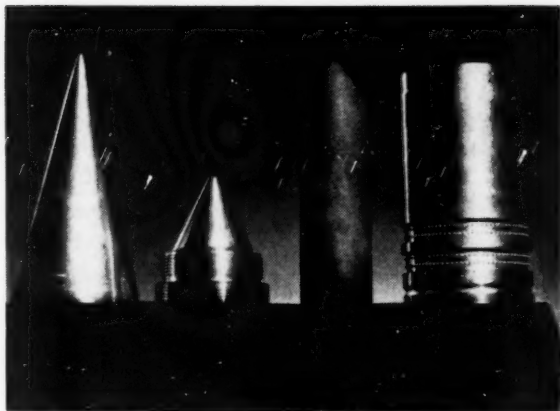
**HENDLEY &  
WHITTEMORE CO.**

100 Blackhawk Blvd.

Beloit, Wis.

➡ Write for complete details.

**"Exploded" view** shows relation of tungsten carbide core to the antitank shell. Left to right, the wind-shield, nose piece, core, and body, less the rotating bands. It is the core, composed of the hardest metal made by man, which gives the destructive "punch" to enemy tanks. Shells of this type were produced in record time during World War II and are now in use in Korea.



Carboly cores would penetrate the thickest armor.

In normal times, delivery of ten new shells such as these would have taken months or even years. And these were not "rough" models. The shell cores had to be held to comparatively close tolerances and, in general, the finished

shell had to be similar to existing 76 mm rounds if they were to be used in guns then at the front.

At 9 o'clock on Monday morning, July 10, the first ten were shipped by a special Army plane to the testing grounds in Maryland.

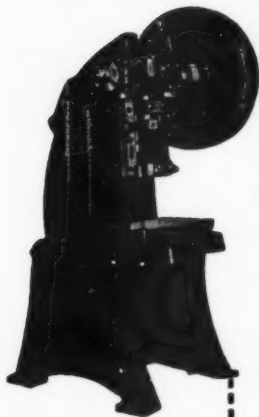
Up to this point the pace had been

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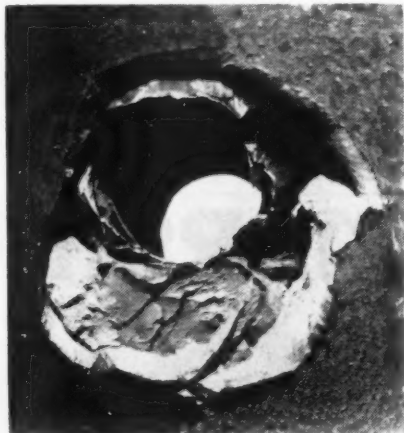
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fast—and it was to get even faster. On Thursday evening the Carboloy Department gathered complete information on mass producing the core. The Army was told by Carboloy that plant capacity was non-existent; tungsten carbide was already being made at peak production capacity; and equipment to make antitank shells was all working overtime elsewhere.

In spite of these hurdles, the production effort was started. A grinder was flown in from Connecticut. A steel storing shed at the Carboloy plant was cleared of more than 20 tons of steel in three days—a job that would normally take weeks—and it was done by hand because the cranes were working in another area. Two machines designed for



The Armor piercing capabilities of tungsten carbide cores are shown in this view of tank armor plate. These anti-tank shells were developed after a communique from General Eisenhower stated, on "D plus 30," that existing shells would not stop German "Tiger" tanks.

the Orient were unloaded from a ship at a San Francisco dock. A Detroit manufacturer built a special sintering furnace in a record 19 hours. Hydrogen had to be brought in for this furnace, and it was found in Ohio. This would require special trucks to take it to the Carboloy plant in Detroit, so the Navy

provided them from one of their Texas bases.

In less than two weeks, production was underway on Ike's cores. In the meantime, on Friday, July 14, other carbide manufacturers in competition with Carboloy were called to the De-

troit plant and shown how to make these cores.

As fast as the shells were assembled, they were loaded on cargo planes and sped straight to the front. Today, this same type shell is being used on the Korean front.

---

### **Expendable carbide insert tool provides double tool life—eliminates tool grinding**

Achievement of superior surface finish together with extended tool life is being experienced by a noted manufacturer of precision communication and recording equipment in machining SAE C-1118 steel at 1000 surface feet per minute using standard Kendex tungsten carbide triangular insert tools produced by Kennametal Inc., Latrobe, Pa.

As performed at the McElroy Mfg. Corp., Littleton, Mass., the operation consists of facing two surfaces of a high frequency transmitter component from a maximum of 4" in diameter down to a 1" dia. center shaft. Work is per-

formed on a  $\frac{3}{4}$  h.p. Logan lathe having a variable drive attachment.

A mirror-like finish is required on the machined surface because it is later plated with a 0.0002" thickness of copper over which a 0.0012" silver plating is applied. Surface is then buffed down and rhodium flashed to prevent tarnish.

To obtain the necessary machine finish a surface foot rate of 1000 is maintained throughout the cut. This is done by varying the r.p.m. from 1000 at the start of the cut to approximately 4000 at the finish by a variable drive unit attached to the Logan lathe and



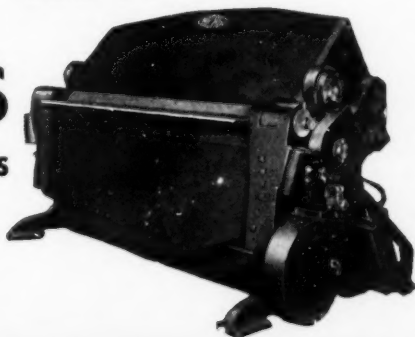
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Special Bending Brakes  
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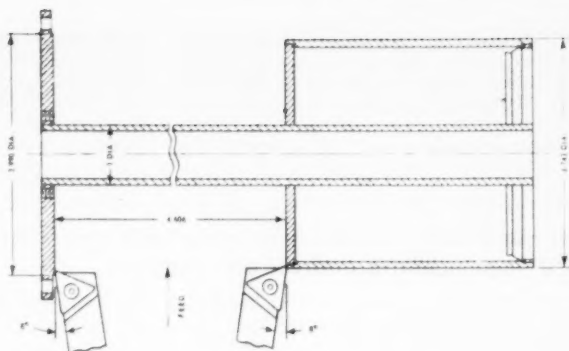
**DREIS & KRUMP**

**MANUFACTURING COMPANY**

**7440 S. Loomis Boulevard, Chicago 36, Illinois**



**Facing** UHF transmitter component at 1000 s.f.m. with two Kendex triangular insert tools. Surface foot rate maintained throughout cut with variable drive unit to give mirror-like finish. Total of 360 pieces faced after which inserts are replaced thus eliminating grinding expense.



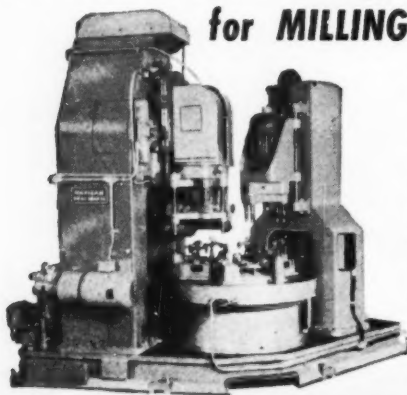
actuated by the tool slide which is fed in at 0.0045" per revolution. A chip guard is used to assure that the finish machined surface will not be scratched.

At a lower surface foot rate a satisfactory finish could not be obtained; while at the higher speed tool life became a problem. Best tool life received with several grades of triangular inserts first tried on this job was only

20 pieces per cutting edge or 60 pieces per insert.

Now, with Grade K8 inserts (most abrasive-resistant grade of Kennametal), 60 pieces are faced with each of the three available cutting edges or 180 pieces per insert. Since depth of cut is only 0.007" the Kendex inserts of left and right hand tools are interchanged to machine an additional 180

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ACTION**



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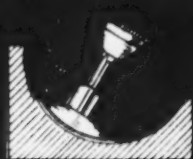
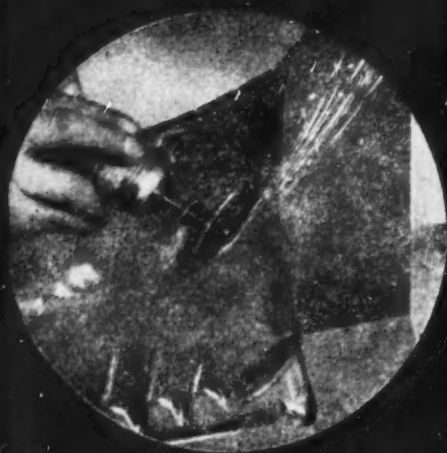
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These discs are available in 10" and 12" diameters. They are made of a special material which is designed to remove metal from the work surface. They are mounted on a special holder which is designed to hold the disc in place and to provide a means of adjusting the pressure of the disc against the work surface.

## and

These discs are available in 10" and 12" diameters. They are made of a special material which is designed to remove metal from the work surface. They are mounted on a special holder which is designed to hold the disc in place and to provide a means of adjusting the pressure of the disc against the work surface.

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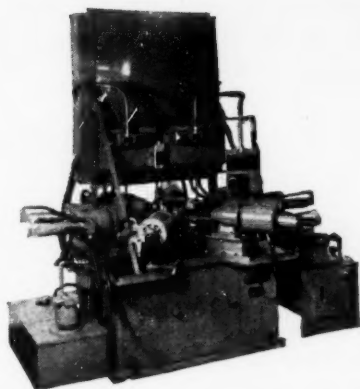
pieces. A total of 360 pieces is faced, after which the expendable Kendex inserts are replaced with new ones, thus eliminating all tool grinding expense on this particular operation.

### Machine drills 3840 holes per hour

A new machine which drills 32 holes of 3/16" diameter in a steel part at the rate of approximately 120 pieces (3840 holes) per hour has recently been announced by the Govro-Nelson Co., 1933 Antoinette, Detroit 8, Mich.

The machine incorporates 8 Model HH Govro-Nelson automatic drilling units, electrically interlocked with automatic, hydraulically operated clamping and indexing.

In operation, the operator places the part on a fixture and presses the start-cycle switch. The part is automatically clamped and eight holes are drilled

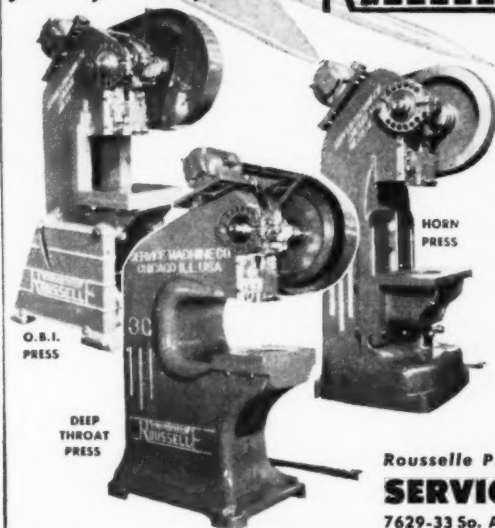


simultaneously at each of the four indexes, thus completing the 32 holes. Then the part is automatically unclamped.

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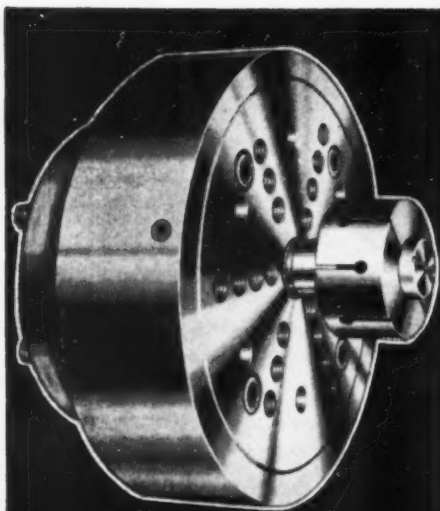
## Automatic honing of gun barrels now possible

For the first time in the history of gun barrel honing, automatic feeding and sizing are possible with Microhon-

ing equipment, manufactured by the Micromatic Hone Corp., of Detroit.

With the patented Microdial (auto-

**Model 606** Horizontal Hydrohoner manufactured by the Micromatic Hone Corp., Detroit. In the first application of its kind, this machine, equipped with automatic feed and sizing controls, is used to Microhone 20 mm and 60 calibre gun barrels



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matic feed) and Microsize (automatic sizing) features installed on a Model 606 or 612 horizontal Hydrohoner, gun barrels up to four inches in diameter can be microhoned within tenths of a thousandth of an inch tolerances in a completely automatic operation.

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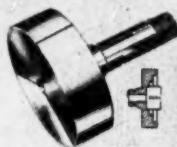
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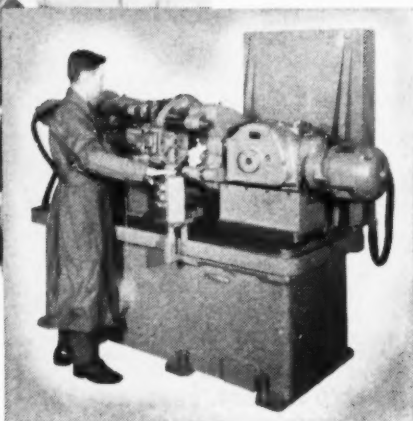
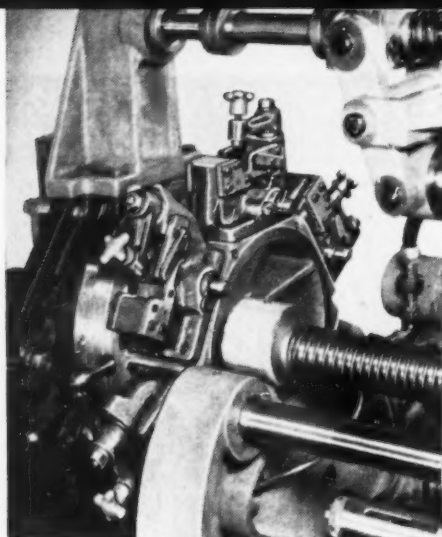
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## Showing Practical Application of WESPO Parts by Large Machine Tool Builder

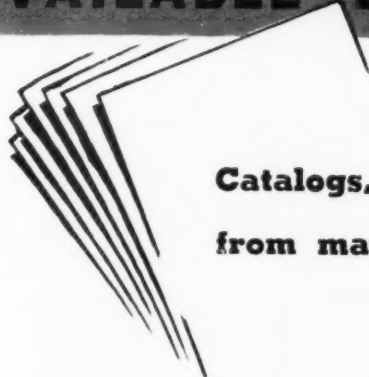
The use of WESPO swing clamps as an integral part of a special machine designed and produced by Hartford Special Machine Co. is an indication of the tendency of design engineers and tool engineers to standardize on WESPO clamps and components.

The nation-wide use of WESPO clamps and components is due not

only to the practical design of WESPO clamps and components, but, also, to their effectiveness in work-holding and their economy. Engineers have found that the use of WESPO components saves them up to 70% in fixture cost. Write for catalog of 15 different type clamps in 100 sizes and over 350 component parts.

**WEST POINT MANUFACTURING CO.**  
26931 W. SEVEN MILE ROAD • DETROIT 19, MICHIGAN

# AVAILABLE LITERATURE



## Catalogs, bulletins available from manufacturers

1. **Six simple steps** to streamline your lubrication program are outlined in the booklet entitled "How to Simplify and Save with Pure Industrial Lubricants."

Another booklet details the selection of cutting fluids, with sections on testing procedures, cutting techniques, tool angles, machinability tables, etc. Write The Pure Oil Company, Dept. BB, 35 E. Wacker Drive, Chicago 1, Ill.

2. **On-the-spot tests** of Ames portable hardness testers in actual use are shown in a 20-page catalog of the Ames Precision Machine Works, Dept. BB, Waltham 54, Mass. Also included is an explanation of the principles of Rockwell hardness testing, as well as a chart of hardness scales.

3. **Operations listed as possible** with the Kling combination shear, punch and coper are: shearing plates, angles or bars; punching coping angles; notching, cutting and mitering. Write for 10-page bulletin issued by the Kling Bros. Eng. Works, 1323 N. Kostner Ave., Chicago, Ill.

4. **Essential data on gages** and gage standards are arranged in compact and accessible form in a four-page folder issued by the Standard Thread Gage Co., Dept. BB, 26538 West Seven Mile Road, Detroit 19, Mich. In addition to manufacturing precision thread plug

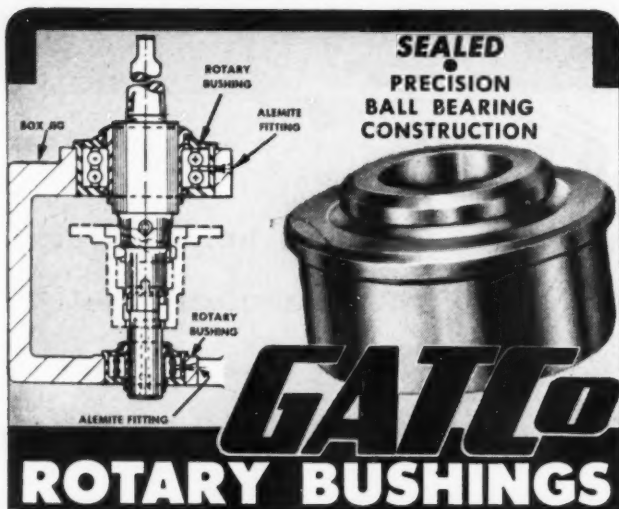
and thread ring gages, the company maintains a complete reconditioning service.

5. **An 11 in. x 14 in. wall chart**—covering the complete range of 327 drill sizes from .0135 in. to 1.000 in. diameter—has been prepared by the Ace Drill Corp., Dept. BB, Adrian, Mich. This chart consolidates fractional, wire, letter and millimeter sizes into one consecutive listing, in numerical order of their decimal equivalents.

6. **Operation and design features** of the Sheffer Super Grip diaphragm chuck are summarized in an eight-page bulletin offered by the manufacturer, the Sheffer Collet Co., Dept. BB, Traverse City, Mich. Cross-section drawings and other data are given of this diaphragm chuck, which has been designed to eliminate air pressure overload.

7. **The Walker lifting magnet**—designed "on the square"—is said to allow corner cleaning in cars and pig bins without supplementary manual labor. A circular issued by the manufacturer, the O. S. Walker Co., Inc., Dept. BB, Worcester 6, Mass., also lists features of the Walker magnetic pulley.

8. **"How to Select a Press"** for blanking, drawing, ironing, squeezing—Bulletin G-47—is a ready guide to help press users determine the type of press suit-



**FOR DRILLING, CORE DRILLING,  
ROUGH AND FINISHED BORING**

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both.

Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

*Write for full information and prices*

**GATCO ROTARY BUSHING CO.**

42330 ANN ARBOR ROAD, U.S. 12, PLYMOUTH, MICH.

Telephone PLYMOUTH 1472

able for specific job requirements and efficient methods of power application. In this 20-page bulletin the Verson All-steel Press Co., 9303 S. Kenwood Ave., Chicago 19, Ill., includes single, double and triple action mechanicals and hydraulics, open back inclinables, post type hydraulics, knuckle joint presses, forging presses and fully automatic transfer feed presses.

9. "This Carbide Age" tells the history and development of Wessonmetal tung-

sten carbide, outlines its chemical constituents and operation features, together with a summary of actual use applications. This handy manual is available from Wesson Metal Corporation, Dept. BB, Lexington, Ky.

10. The uses of Bridges micro precision drilling machines—with small drills designed for watch, clock, optical and instrument trades and engineers—are described in a four page illustrated bulletin by the manufacturer's agent, Marton Equipment, Inc., 4 Essex Street,



# FEDERAL DIAL FEED PRESSES

28 YEARS OF QUALITY CONSTRUCTION



No. 7 Dial Feed  
Capacity, 80 tons

*Equal  
in output—*  
to several standard presses!

Often you will find a single Federal Dial Feed doing the work of three to five standard presses! Automatic loading and ejector mechanisms provide still further economies. Rugged, precision-built Federals are setting new highs in faster, safer, precision work—cutting down-time, reducing accidents, eliminating more expensive equipment. Finest materials and workmanship. Six to 80 tons.

*Write for catalog!*

THE FEDERAL PRESS COMPANY, 509 DIVISION ST., ELKHART, INDIANA

Dept. BB, Beverly, Mass. This portable machine is adaptable for vertical or horizontal drilling. Special indexing table is available for pitch circle drilling; also micrometer indexing table for precision jig boring.

11. "Technical aids for small business" listed as available from the Small Defense Plants Administration, Management Service Division, Washington 25, D.C., are: (1) Proper alignment of machine tools; (2) Sharpening of drills,

lathe tools and milling cutters; (3) Care and maintenance of belt, chain and gear drives; (4) Sharpening certain metal cutting tools used in machine shops; (5) Precision measurement of workpieces; (6) Selecting the right tool steel; (7) Machining aluminum—I; (8) Metallizing; (9) Machining Plastics—I; (10) Machining Aluminum—II; (11) Machining Plastics—II; (12) Machining, repairing and heat treating cast iron workpieces; (13) Cutting oils and coolants;



# Machine de-burring with **NOBUR** pays BIG production dividends!



**NOBUR Tools** turn a slow bench operation into fast and efficient machine work! Remove burrs on multi-walled parts with a smooth, clean cutting action that won't mar highly finished surfaces. Eliminate rejects from slow, costly hand work with files, scrapers and abrasives.

**Nobur Tools** are used on any lathe, drill press, portable drill or flexible shaft. Operation of the double-edge cutting blade is easy and safe...no skilled help is required, and the spindle never needs to be stopped for either de-burring or chamfering.

**Nobur Tools** cut freely on either hard or soft metals, are simple in construction and are made in sizes to cover a full range of hole diameters. \*NEW "DS" SERIES extends range of **NOBUR** applications to holes as small as  $\frac{1}{8}$ " diameter. **WRITE FOR FULL DETAILS TODAY!**

Parts like these  
quickly de-burred  
with



**NOBUR MANUFACTURING COMPANY**

717 N. VICTORY BLVD., BURBANK, CALIF.

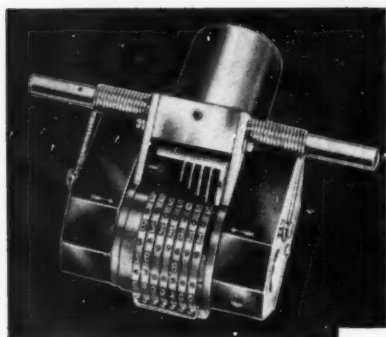
(14) Corrosion in machine shops—Causes and prevention; (15) Machining brass and bronze workpieces; (16) Machining magnesium alloy workpieces; (17) Taps and dies; (18) Surface cleaning techniques; (19) Care and maintenance of grinding wheels; (20) Maintenance of power hand tools.

**12. In a four page bulletin,** Kenco Mfg. Co., 5211 Telegraph Rd., Dept. BB, Los Angeles 22, Calif., presents technical information and drawings of the firm's

four-in-one, four and five ton reclining, deep throat, bench or floor type punch presses.

**13. The Tech Clamp,** a quick acting adjustable holding device, is described in a folder which also points out its usefulness for handymen and hobbyists, in addition to its industrial applications. Write Tech Clamp Co., Inc., 177 State St., Boston 9, Mass.

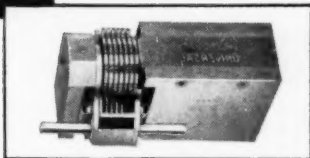
**14. "Metals and alloys of industry,** their compositions and uses," are conveniently



*Numbers...*  
**FROM 1 TO**  
**999999999**

**ON STEEL, BRASS,  
COPPER, ALLOYS,  
PLASTIC & WOOD**

**AND THAT'S NOT ALL—**



*"Trade Mark" Numbering Head*

these new Parker numbering heads for punch press stamping come in four to ten digit models and stamp consecutive or repeat numbers cleanly and sharply into the most rugged stock. A simple duplicating attachment can be added if required and a compound numbering head can be manufactured to your specifications to embody a trade mark, name or group of symbols to be stamped in one operation.

The larger heads have a direct reading feature which enables determination of machine setting at a glance from engraved numbers on the front of lettering wheels. Here is another instance of Product Flexibility. Let Parker's expert craftsmen and eighty years of experience solve your marking die and stamping problems too!

**SEND FOR PARKER'S NEW CATALOG NOW!**

Be sure to have this fact-filled brochure describing hundreds of Parker stamps and marking dies in your file.



THE  
**PARKER**  
STAMP WORKS, INC.  
MARKING DIE & MACHINERY DIV.  
FRANKLIN AVENUE • HARTFORD, CONNECTICUT

arranged in chart form by Sam Tour & Co., Inc., Dept. BB, New York 6, N.Y.

**15. Cutting applications** with a portable power saw are considered in a 24-page manual, "Skil Saw Problem Solver," put out by the Skil Corp., 5033 Elston Ave., Dept. BB, Chicago 30, Ill. Thirty different materials are listed, with the

most effective method of cutting applicable to each material.

**16. Made up in loose-leaf form** with full scale drawings for easy tracing purposes, Catalog No. 4 features the Morton line of fixture clamps and component parts. Photographs, cutaways, diagrams, specifications and price lists are likewise included. Write Morton

**TEN THOUSAND  
GAGES  
AT YOUR FINGERTIPS**

WITH

**AMERICAN STANDARD**

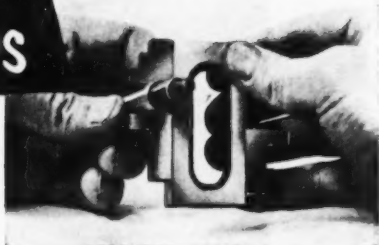
**MULTI-GAGE**

**ADJUSTABLE SNAP GAGE  
and HOLE GAGE**

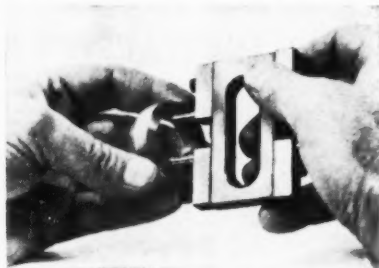
No valuable time lost waiting for  
delivery of special gages.

- SIMPLE TO SET WITH MICROMETER  
or BLOCKS
- LOCKS FIRMLY IN POSITION
- SPLIT TENTH ACCURACY

If your dealer cannot supply you, write to



MULTI-GAGE with snap gage jaws.



MULTI-GAGE with hole gage jaws.

**AMERICAN STANDARD COMPANY**

**Dept. B. Plantsville, Connecticut**

Machine Works, 2421 Wolcott St., Detroit 20, Mich.

17. Actual operation of the Dickerman automatic stock reel is described and illustrated with accompanying drawings in literature of the H. E. Dickerman Mfg. Co., 321 Albany St., Dept. F, Springfield, Mass. Automatic punch press feeds and wire straighteners are also shown.

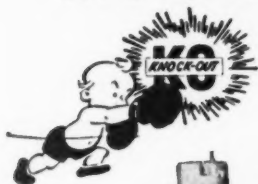
18. "Die Finishing Machines" Bulletin No. 100E describes Stamets units for die diameters 11 to 17 in., handling tubing up to 3½ in.; and die diameters 17 to 23 in., handling tubing 3½ to 5 in. The bulletin explains sequence of operations and construction of the ma-

chines, also contains illustrations and table of specifications. Write Wm. K. Stamets Co., Dept. DF-BB, Jenkins Arcade Bldg., Pittsburgh 22, Pa.

19. In the third edition of its catalog of slitting lines for coils and sheets, The Yoder Company, 5509 Walworth Ave., Cleveland 2, Ohio, presents specifications, capacity tables and other data on uncoilers, slitters, recoilers, coil cars and scrap choppers. Basic information on design, selection and operation of slitters and slitting lines, time studies and analysis of operating cycle, discussion of coil handling and scrap disposal methods are also included in the catalog contents.

# There's a reason 76%\*

of all popularly-priced Tool and Cutter Grinders  
sold in 1952 were "Knock-Outs"



MODEL B860

Will do  
anything that  
machines  
costing 2 or 3  
times more  
will do . . .  
yes and in  
less time.

Distributed  
Only Through  
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ABERDEEN, S. D.



\*Sales  
Statistics  
Furnished  
on Request

20. Instrument mercury with dispensing and drop control tips, treated specifically for use in instruments, is discussed in a circular of the Bethlehem Apparatus Co., Inc., Front and Depot Sts., Dept. BB, Hellertown, Pa. Batch analysis certification is also explained.

21. A new brochure illustrates and describes the line of tools available from Heinrich Tools, Inc., Dept. 103-E, Racine, Wis., formerly the National Machine Tool Co. of that city. Products

listed include: "Handnib" hand operated nibblers, shears, rod cutters and punches; "Grip Master" screwless drill press vises; "Handy" screw type drill press vises; and "Grip Master" screwless fixture locks.

22. Helpful information for the selection of the brazing filler metal best suited for a given application is included in specifications obtainable from either the American Welding Society, 33 West 39th St., Dept. BB, New York 18, N.Y., or the American Society for

## Drill Hardened Steels without Annealing —



With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon—high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

**You Harden It—We'll Drill It—  
With "HARDSTEEL"**

**BLACK DRILL COMPANY, INC.**

1374 East 222nd St. • Cleveland 17, Ohio

Also makers of—  
**BLACK DRILLING  
UNITS—AUTOMATIC,  
SELF-CONTAINED—  
FOR COST-CUTTING  
PRODUCTION ON  
ALL MATERIALS**

Write for information

Testing Materials, 1916 Race St., Dept. BB, Philadelphia 3, Pa.

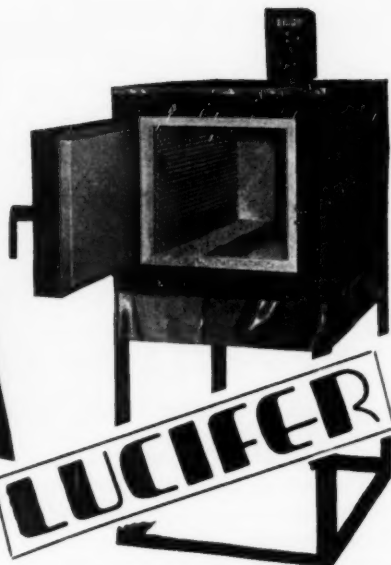
**23. When and how to sharpen tungsten carbide mining tools,** equipment required and best techniques to follow are included in the 26 page catalog and maintenance instruction manual, No. CM-110, available from Carboloy Dept. of General Electric Co., 11129 E. 8 Mile Blvd., Detroit 32, Mich.

**24. A comprehensive catalog—"Marking Tools"—**is available from The Parker

Stamp Works, Inc., Franklin Ave., Dept. BB, Hartford, Conn. Type holders and steel type, numbering heads, roll marking dies and scores of marking dies and stamps of every type for hand or press use are illustrated and graphically described.

**25. The Williams F-3 universal punch and die making machine** is presented in an eight page bulletin which describes operations and shows photographs of typical work produced on the machine. Write Connecticut Tool &

**SAVE  
3  
WAYS  
WITH A**



CHECK THESE PRICES

Furnace Size	2000*	2300*
6x 6x12"	\$ 467.00	\$ 548.00
9x 9x18"	647.50	764.00
12x12x24"	912.00	1068.90
18x18x36"	1419.75	1629.50

Complete with 100% automatic electronic controls.

## **ELECTRIC FURNACE**

**1 SAVE** with a Lucifer Electric Furnace on **FIRST COST**. Our straight line production permits economical selling price, despite use of highest quality materials throughout. Check costs on other furnaces . . . feature by feature . . . you'll save money on the Lucifer Electric Furnace **EVERY TIME**.

**2 SAVE ON MAN HOURS** with a Lucifer Electric Furnace. Less operator attention needed—Lucifer controls are **EXACT**. They reach **SPECIFIED** heat rapidly and retain **SPECIFIED** temperature without variation. No special experience required when you use a Lucifer Furnace.

**3 SAVE** on maintenance expense with a Lucifer Electric Furnace. Finest refractory materials are built into Lucifer Furnaces for better, more efficient heat retention. Elements are guaranteed . . . long lived . . . trouble free. You save three ways with a Lucifer Electric Furnace. More than two thousand satisfied users.

WRITE for **FREE** literature, specifications and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering advice without obligation.

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Route No. 611

Neshaminy, Pa.

Phone Hatboro 0411

*Sole Manufacturers of Lucifer Electric Furnaces*

Engineering Co., 544 Iranistan Ave., Dept. BB, Bridgeport 5, Conn.

26. "Compressed Air Power in Industrial Production" discusses pneumatic tools and aids to production and presents concisely the many uses of compressed air in industrial production. This reference pamphlet is available at a small charge from the Compressed Air and Gas Institute, 1410 Terminal Tower, Dept. BB, Cleveland, Ohio.

27. How Delta drill units are used by manufacturers in special purpose machines to do a series of automatic operations is shown in Catalog No. AD-723. "Air Powered Hydraulic Drill Unit," offered by the Delta Power Tool Division, Rockwell Manufacturing Company, Dept. DC-H21, 400 N. Lexington Ave., Pittsburgh 8, Pa.

28. Characteristics of the Ferguson roller gear drive; how to determine the



## **KNU-VISE pliers help speed aircraft production**

Twenty-two Knu-Vise toggle-action pliers accompany this huge aircraft assembly jig when delivered to a prominent airplane manufacturer. The pliers play an important part in attaching longerons and aluminum angles to section of fuselage.

This job shows one of the countless ways in which Knu-Vise pliers and clamps are used to facilitate production.

Three Knu-Vise models selected for their high efficiency in specific operations: P-400, P-1200, P-1800.

Photo, courtesy of Banner Die & Fixture Co., Detroit.

Sales Offices in principal cities. Teletype DE-49

**KNU-VISE  
PRODUCTS**

**LAPEER MFG. CO.**

3052 DAVISON ROAD • LAPEER, MICHIGAN

type of drive necessary for individual operating requirements; and how to select the proper drive for a particular installation are all considered in Bulletins No. 101, 102, and 103 offered by the Roller Gear Division, Ferguson Machine & Tool Co., P.O. Box 191, Dept. BB, St. Louis 21, Mo.

29. **Features embodied** in the Brown utility vise are said to save considerable setup time, according to illustrated Bulletin No. 23-Y published by the Brown

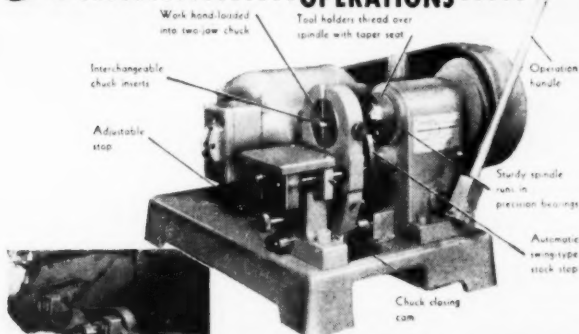
Engineering Co., 126 N. Third St., Reading, Pa. The vise serves as a multi-holder, accepting many different shapes of objects normally requiring several types of vises.

30. **What is carilloy FC?** Where can you use it? How do you profit? are questions answered in the four page folder on prehardened free cutting carilloy FC steel, published by the United States Steel Co., 208 S. La Salle St., Dept. BB, Chicago 4, Ill.



# Speeds

## CHAMFERING, POINTING, FACING, REAMING & OPERATIONS.....



### EXCLUSIVE FEATURES

**OF PINES END-FINISHER SAVES TIME ON  
TUBE, PIPE, BAR JOBS**

At Kold-Hold Mfg. Co., two Pines Air-Operated Machines with single foot control speed tube deburring and facing operations. One operator produces 1200 tube ends per hour.

Pines Portable End-Finisher is especially designed for fast, accurate work. Small and compact, its exclusive operating features save time. Forward travel of operating lever clamps and feeds work to rotating cutters in one pass. Operator always has one hand free for stock handling. Equipped with quick, interchangeable tool holders, chuck inserts, 8-speed sheave (760 to 3920 rpm), sturdy spindle, grease-sealed precision bearings. Unit illustrated handles stock diameters up to 2". Maximum feed stroke is 1 1/4". Automatic air-operated units for higher production work and larger sizes up to 5" capacity are also available.

*Write for Free  
Bulletin*



▲ Write today for more facts. Learn how these machines are built to save time on a wide range of work.

**PINES** ENGINEERING CO., INC.  
Specialists in Tube Fabricating Machinery  
REAMING · CHAMFERING · CHUCKING · THREADING MACHINERY

693 WALNUT · AURORA, ILLINOIS

31. "How one press does the work of two and cuts costs seven ways on cartridge cases and similar work" is the theme of Bulletin No. 219, available from Clearing Machine Corporation, 6492 West 65th Street, Chicago 38, Ill. The folder pictures a double end horizontal hydraulic press.

32. The Flynn line of boring tools and accessories for toolroom and production operations is illustrated with blueprint diagrams, specifications and dimensions in an eight page pamphlet by the manu-

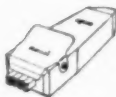
facturer, Flynn Manufacturing Co., 133 Flowerdale, Dept. BB, Ferndale 20, Mich.

33. Van Norman No. 22L and 22M ram type milling machines are said to solve daily fluctuating milling requirements in the toolroom, machine shop, production department, experimental laboratory, pattern shop, etc., according to an illustrated folder of the Van Norman Company, Dept. BB, Springfield 7, Mass.

## ACROMARK FOR

### HERCULES HOLDERS

and Shoulder Style  
Steel Type for number-  
ing.



### SPEED MODEL

Numbering  
Machines for  
consecutive  
or random  
numbering in  
a press.



Model HN Num-  
bering Machines  
—Hand Style.  
All numbers on  
each wheel.

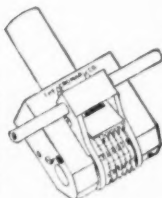


### ACROMARKER

Name-Plate stamping  
machines are made  
in several models  
and sizes for hand  
or foot operation.

### AUTOMATIC NUMBERING HEADS

Numbering head  
shown consecutive-  
ly numbers steel  
parts or name-  
plates. Used in a  
punch press, foot  
or arbor press.  
Hand styles also  
available.



### ACROMARK

Series 9A Marking Ma-  
chines are adaptable to  
marking just about any  
product or material. Use  
straight dies for mark-  
ing rounds. Roll dies  
for marking flats.

Write for more complete information on  
these and other ACROMARK number-  
ing and marking machines.

**THE ACROMARK CO.**

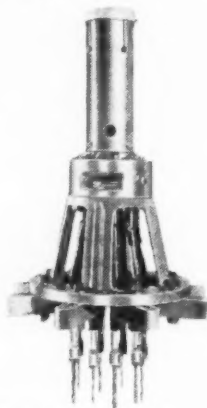
15 MORRELL ST.

ELIZABETH 4, NEW JERSEY



## UNIVERSAL JOINT DRILLING HEAD

From Errington . . . pioneers in the development of  
hi-speed production tools . . . comes the new UNI-  
VERSAL JOINT DRILLING HEAD. This dependable  
tool is adjustable to any pattern of holes . . . and is  
available with 4 to 12 spindles. The head features all  
aluminum housing construction, thrust bearings and  
gears turned on spindles.



Two Sizes:

0—0 to 1/4" Full range of collets furnished  
1—3/16 to 1/2"—1 Morse Taper socket or  
chucks for straight shank drills.

Send us your applications for quotations on the proper  
head for your jobs. No obligation, of course.

**ERRINGTON Mechanical Laboratory, Inc.**

Established 1891

Main Office and Plant: STATEN ISLAND 4, NEW YORK

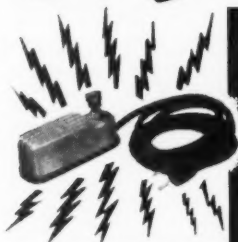
**35. Bulletin W-1805** lists the wide variety of automatic controlling, recording and telemetering instruments manufactured by The Bristol Company, Dept.

**36. Oil refinery catalyst slide valves**  
and stone mill hammers that have been  
wear proofed with Colmonoy No. 1 al-  
loy are illustrated in Form No. 102 by  
the Wall Colmonoy Corp., 19345 John  
R. Street, Dept. BB, Detroit 3, Mich.

**37. Inside cutting, beading and flanging** of sheet metal parts up to 10 gage mild steel and 11 gage stainless steel are results obtainable on the Wales Tru-



**★ ATTACH INSTANTLY**  
TO EITHER CURVED OR FLAT SURFACES



## PORTABLE DEMAGNITIZER

Completely de-magnetizes by merely sliding over surface of the item. Lightweight — easily portable — small size for easy use in hard-to-reach places.

**10 TOOLS ★ HUNDREDS  
OF SHOP USES . . . . .**

Handy-Lites give you light where you need it — light those hard-to-see places. 4x magnifier. Heavy duty indicator with or without surface gage shoe. Indicator holders take nearly any indicator without haphazard clamping.

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**RULES • PRECISION TOOLS**  
**FROM YOUR DISTRIBUTOR**



LUFKIN RULE CO., Saginaw, Mich. Dept. 88

RUSH ME YOUR FREE BOOKLET DESCRIBING  
LUFKIN MITI-MITE MAGNETIC PRODUCTS.

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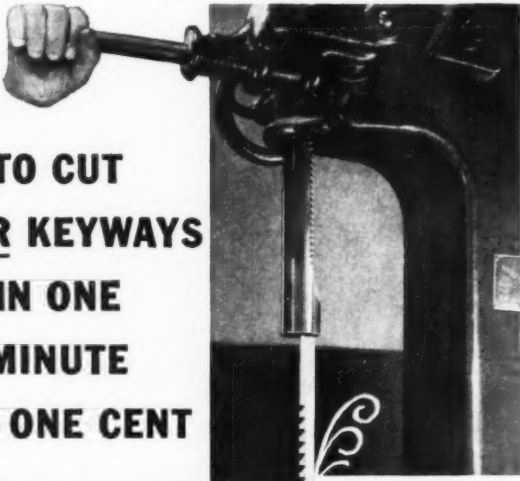
Edge contour shear, as described in Catalog TS of the Wales Strippit Corp., 396 Payne Avenue, North Tonawanda, N.Y.


38. Western machine tool drives for motorizing cone driven standard or special machines are shown in a bulletin released by Western Manufacturing Company, 3400 Scotten Avenue, Dept. BB, Detroit 10, Mich. Also featured are specifications for Western transmissions for plate or platform mounting.

39. Features of the Modern five way drilling and tapping machine for aircraft jet engine housings are summarized in Bulletin No. 103-35, published by Modern Industrial Engineering Company, 14230 Birwood, Dept. BB, Detroit 4, Mich.

40. Of interest to users of carbide, tool designers and engineers is the enlarged technical data section of Vascoloy Ramet 1953 Catalog No. VR-441, which includes such items as brazing information; chip breakers and chip con-

**TO CUT  
YOUR KEYWAYS  
IN ONE  
MINUTE  
FOR ONE CENT**



 **CUT THIS COUPON**  
and get complete specs and prices  
on du MONT *Minute Man*<sup>®</sup>  
**KEYWAY BROACHES and KITS**

The du MONT CORPORATION, Greenfield, Mass.

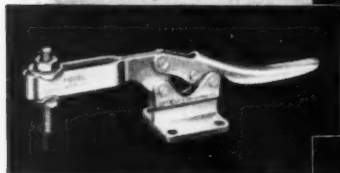
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Name .....

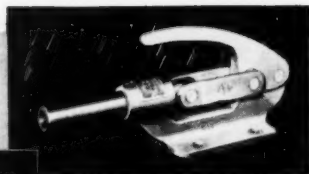
Company .....

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**Save  
DOLLARS**



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**— SPEED  
PRODUCTION**



## **TOGGLE CLAMPS**

De-Sta-Co Toggle Clamps are extremely flexible in their application and are economically and easily adapted to work-holding fixtures for assembly, welding, bonding, machining or other production processes. Smooth, fast, powerful clamping action clamps parts quickly . . . holds them firmly in perfect alignment . . . releases instantly for easy removal and insertion of new workpiece.

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**DETROIT STAMPING COMPANY**

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trol; cutting speed and horsepower table; turning stainless steels; causes for tool failure; and new grade table giving principal properties, characteristics and fields of application for the nine V-R standard tool grades. Write Vascoloy Ramet Corp., Dept. BB, Waukegan, Ill.

41. Users of castings as components in their manufacturing processes should find helpful suggestions in Bulletin No. 36, entitled "Meehanite pump castings,"

offered by Greenlee Foundry Company, 4600 West 14th St., Dept. BB, Chicago 50, Ill.

42. Quick changeover from job to job is claimed for the Alfing Model BK-25 heavy duty upright drill. Kurt Orban Company, Inc., 205 East 42nd St., New York 17, N.Y., is the distributor.

43. Lake Erie hydraulic bulldozers in service are shown in Bulletin No. 11.1 by the Lake Erie Eng. Corp., Dept. BB, Buffalo, N.Y. Hot and cold bending

**A good coolant pump plus a good  
machine tool = FASTER, BETTER  
PRODUCTION FOR YOU**

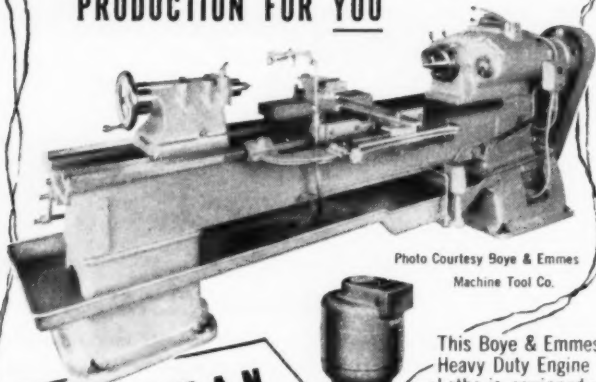


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**1816 READING ROAD**

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and forming operations are illustrated, and special features in design and construction are summarized.

**44. Inserted blade milling and boring cutters for all makes of equipment are shown in Catalog No. 60-E compiled by the Ingersoll Milling Machine Co., Dept. BB, Rockford, Ill. Other features explain carbide milling of steel, proper selection of tools, cutting methods and cutter grinds for all kinds of work.**

**45. Keller power hack saws in 10 different models are pictured and described, with accompanying specifications, in Bulletin No. 1052 of the Sales Service Machine Tool Co., 2357 University Avenue, Dept. BB, St. Paul 4, Minn.**

**46. A bulletin prepared by Paragon Electric Co., Dept. BB, Two Rivers, Wis., introduces three new series of timers and clarifies engineering information on another timer series.**



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absolutely necessary for  
HIGH SPEED Rotating Parts"**

says G. Selig, vice president and plant manager of Remsel Industries, Chicago, Illinois, where this "Bear" Dy-Namic Balancing Machine is used to balance impellers.

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Tells how you can easily, quickly, economically balance rotors, armatures, crankshafts, and any other part that turns, weighing from 4 oz. to 8 tons! See how to reduce wear, eliminate noise and vibration, improve all-around performance of finished product. Your copy sent without cost or obligation. Bear Mfg. Co., Dept M-20 Rock Island, Ill.




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STATIC AND DY-NAMIC BALANCING MACHINES  
balance rotating parts weighing from 4 oz. to 8 tons

47. To acquaint the trade with the diversified products manufactured and the many industries served, the Ex-Cell-O Corporation, 1200 Oakman Blvd., Dept. BB, Detroit 32, Mich., is releasing a new general products catalog for distribution to purchasing departments and engineers interested in machine tools and cutting tools.

48. Forty five illustrations and sketches show design details, typical applications and operating controls of the Landis

Type DH crank pin grinder for precision grinding of crankshafts on a production basis. Ask for Catalog N-52, Landis Tool Company, Dept. BB, Waynesboro, Pa.

49. Suitability for heavy duty milling, production milling, production grinding and general grinding operations of the Power-Grip magnetic chuck is covered in Form No. MC-2, issued by the Sundstrand Magnetic Products Div. of the Sundstrand Machine Tool Co., 1020 Ninth St., Rockford, Ill.

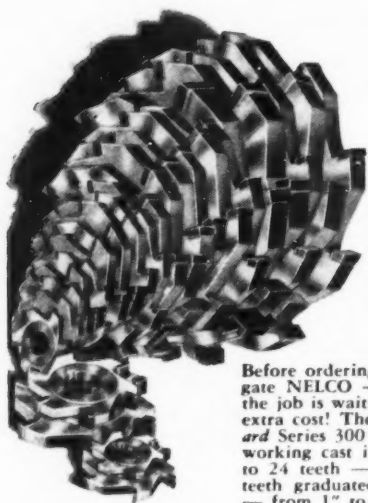


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130 different Side Milling Cutters	40 different Face Milling Cutters
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**NELCO TOOLS**

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**EDGE** in Production

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

50. Lindberg-Fisher aluminum melting furnaces are described in Bulletin No. 310 by Lindberg Eng. Co., 2450 West Hubbard St., Chicago 12, Ill. The bulletin explains design and application features.

51. The addition of end mills and counterbores completes the Besly line of drills, reamers and taps which have been undergoing development during 1951 and 1952. For catalog, write Besly Welles Corp., Dept. BB, Beloit, Wis.

52. Three types of rolling fixtures—the Model 602 for external spur and helical gears, the Model 602-A for cluster gears and gears with integral shafts and centers, and the Model 702 for internal gears—are illustrated in Bulletin No. 6-702 issued by the Michigan Tool Co., 7171 E. McNichols Road, Detroit 12, Mich.

53. Bulletin No. 15 contains specifications for the four sizes of U.S. multi-slide machines built primarily for the

# ***A must in every tool room and inspection department . . .***

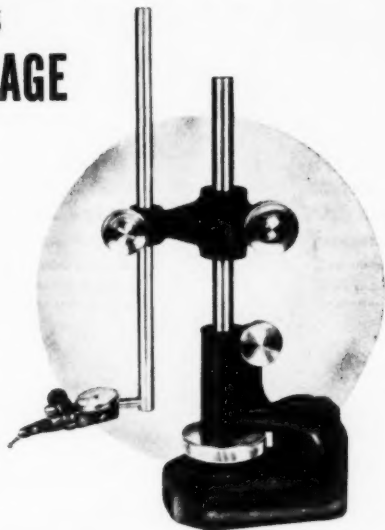
## **AMERICAN STANDARD'S PRECISION SURFACE GAGE**

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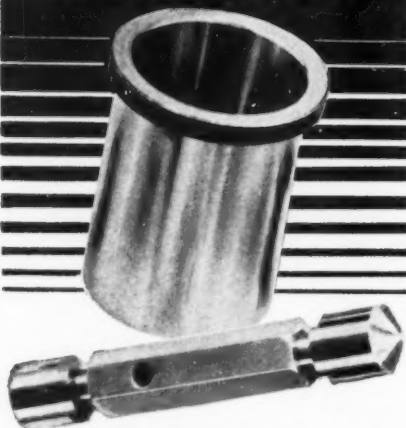
automatic high speed production of precision metal stampings from coil stock. Write U.S. Tool Company, Inc., Dept. BB, Ampere (East Orange), N.J.

54. **S. G. Frantz Co., Inc.**, Dept. BB, Brunswick Pike and Kline Avenue, Trenton 6, N.J., in their Bulletin 76 provide complete information on the Frantz "Ferrofilter" permanent magnet separator.

55. "Management aids for small busi-

ness" available from the Small Defense Plants Administration, Management Service Division, Washington 25, D.C., include the following: (1) How small plants can sell to the Federal Government; (2) Adequate production control; (3) Reducing accident costs in small industrial plants; (4) Business insurance—I; (5) Reducing accident costs through safe working conditions; (6) Is your labor turnover cost too high?; (7) Reducing accident costs by the use of safety committees; (8) Incentive

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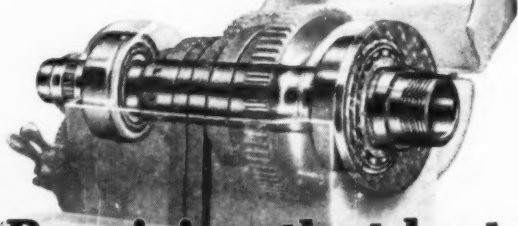
techniques for use in small businesses; (9) How the small plant can analyze old and new markets; (10) Saving manpower in industry; (11) Minimizing the cost of breaking in new personnel; (12) Reducing accident costs through reports and records; (13) Small plant health and medical programs; (14) Subcontracting for small plants; (15) Business insurance—II; (16) Methods engineering for the small plant; (17) How the Walsh-Healey Public Contracts Act affects government supply contractors; (18) Changes

in organization responsibilities as a plant grows; (19) Two dozen ideas for effective administration; (20) Reducing accident costs through safe work methods; (21) Business insurance—III; (22) Developing foremen in small plants. 56. Wohlrip Eng. Co., Dept. BB, 589 Central Ave., East Orange, N.J., has issued a bulletin describing their non-rotating "hole depth control" drill stop. It is used for drilling, center drilling, counterboring, countersinking, reaming and end milling.

# SHELDON

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- Rigid, Heavily cross-strutted 1-piece Beds—2 V-ways, 2 Flat ways
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- Heavy Carriage with wide bearing on bed.
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### ... "ZERO PRECISION" TIMKEN TAPER ROLLER BEARINGS

No lathe can be more accurate than its spindle bearings. Hence before buying any lathe one should check the *exact* type and tolerances of bearings used.

The No. TS-56B (and several other) SHELDON Precision Lathes have Timken "Zero Precision" Taper Roller Bearings, held to tolerances of .00015". Not only are these the most accurate bearings used in any lathe, they are the sturdiest type . . . hold their accuracy thru long hard use . . . hold it even under abuse. With the other stamina features built into SHELDON Precision Lathes, they assure continued accuracy, without costly maintenance, thru years of hard service.

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**SHELDON MACHINE CO., INC.**  
4242 N. Knox Ave., Chicago 41, Illinois

# What's New

## IN

## METALWORKING

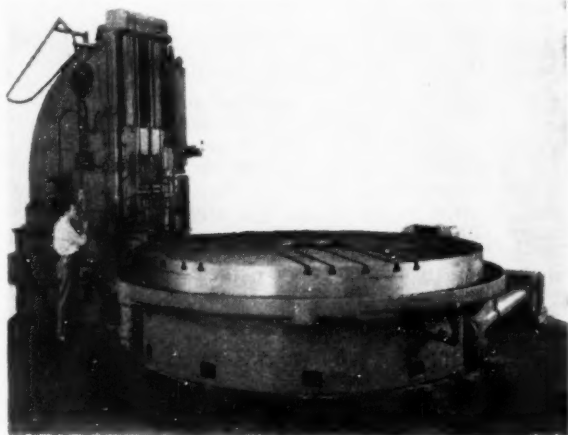
### Michigan Tool Announces New Line of Gear Finishers for Shaving Large Gears

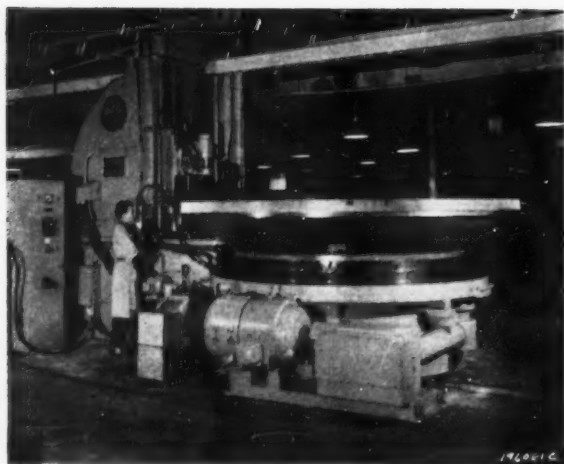
IT IS CLAIMED that large gears, up to 15' in diameter and with up to 48" face width, can now be finished more quickly, accurately and economically as the result of the introduction of a line of standard vertical large gear shaving machines by Michigan Tool Co., Dept. BB, 7171 E. McNichols Road, Detroit 12, Mich. The machines can be used

for spur, helical, or herringbone gears, internal or external with or without integral shafts, as used in marine, railroad, power plant, ordnance, and other large gear applications.

The introduction of this new line of standard machines is claimed to provide the following advantages: (1) drastic reduction, if not elimination, of

1. This is the Michigan V-180, capable of shaving internal and external gears up to 15' diameter. Dual heads permit two cutters to shave at the same time. Hole in table allows shaving of gears with integral shafts.





**2. Table drive gear** being shaved on the V-120—as all drive gears on these machines are shaved to assure utmost accuracy.

costly and time-consuming lapping; (2) great reduction in finishing time; (3) ability to produce more accurate large gears than by other processes (accuracies down to a few tenths of a thousandth on 15' gears); (4) ability to cut hobbing time by use of multiple thread hobs; (5) ability to produce gears which will mate automatically.

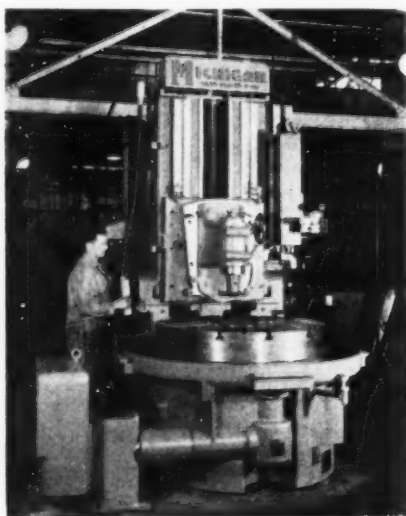
The Michigan V series standard machines are available in four models having respectively 48", 72", 120" and 180" gear diameter capacities. They are designed for high versatility and are provided with facilities for mounting of integral gear checking accessories, making it possible to check gears before removal from the finishing machine.

The considerable cost reduction anticipated in the use of the big Michigan vertical shavers stems first from the fact that gears can be finished by the shaving process in a fraction of the time that it takes to lap or grind the same gears. Other major advantages derived from applying the shaving processes to large gears include: (1) more accurate control of the true involute forms especially at the pitch line; (2) ability to incorporate and control tip relief in the tooth form of the gear tooth (to avoid chance of interference as the mating gears roll into mesh); (3) ability to finish the gear surface to as fine as

12 microinches (average for large lapped gears is around 40 microinches).

In the past it has been the practice to finish large gears to precision toler-

**3. This** Michigan V-48 shows setup for shaving internal gears up to 48" diameter, 30" face width, with or without integral shafts. It is made to shave external gears as well.





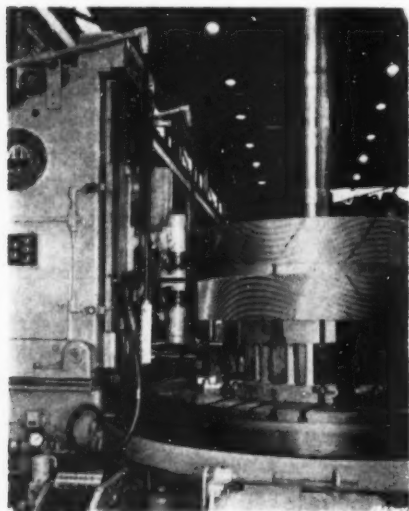


**4. Side view** of the Michigan V-72. Checking fixture, just above operator, checks runout on shaft and rim, and axial pitch of gears being shaved while mounted on the shaving machine.



ances by lapping with cast iron laps, subsequently lapping the mating gears together for final fit. Time required for this process frequently ran into hun-

**5. Close-up** of the Michigan V-120 shaving large herringbone gear with integral shaft. Note the two "guided" shaving cutters mounted on the dual shaving heads. Magnetic chip separator is at lower left.



dreds of hours per set of gears. It was also necessary usually to use a single thread hob for the fine finished form required for finishing by lapping. With shaved gears it is possible to use multiple thread hobs for roughing and semifinishing the gears, thereby greatly reducing hobbing time.

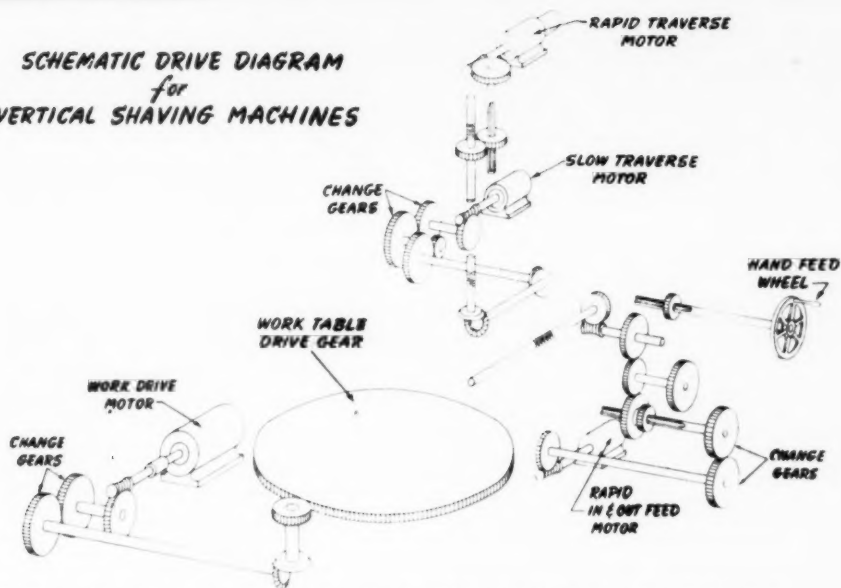
### Individual machine ranges

Largest of the four big gear shavers, the Michigan V 180 will accommodate internal or external gears from 100" to 180" (or 15') in diameter. Spur, helical or gears with or without integral shafts (table is provided with 36" dia. hole) are finished on the machine. The machine has a capacity for shaving spur, helical and herringbone gears 65" wide. Floor space is 208" x 210" with a height of 166".

The V 120 will shave internal or external gears from 60" to 120" in diameter (table is provided with 30" diameter hole to accommodate shafts). Maximum gear width for spur, helical and herringbone gears is 50". The machine is 207" long and 147" wide, with a height of 148". Machine weight is 76,030 lbs.

Having a gear diameter capacity of 20" to 72", the V 72 is the third in the V series line of machines. The V 72 will shave internal or external gears 50" in width. A table hole 18" in diameter

# SCHEMATIC DRIVE DIAGRAM for VERTICAL SHAVING MACHINES



6. This schematic diagram shows the complete drive mechanism on the Michigan V series shaving machines. (Various parts are labeled on drawing.)

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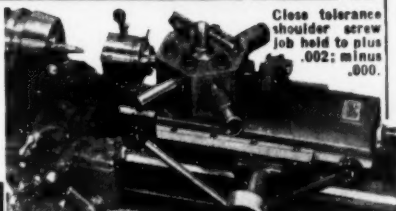
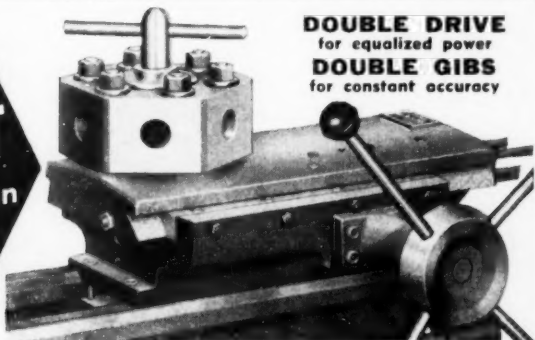
- ✓ All bearings surfaces hand scraped.
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HEXTURRET BED TURRETS, TURRET  
TOOL POSTS and TAILSTOCK TURRETS  
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for equalized power  
**DOUBLE GIBS**  
for constant accuracy



Close tolerance  
shoulder screw  
job held to plus  
.002; minus  
.000.

**Reasonable Deliveries**

allows gears with integral shafts up to this size to be shaved.

The V 48 is the smallest of the V series line, having a gear capacity from 8" to 48" in diameter. Hole in table is 12½" diameter. It will shave internal gears as well as external gears.

Work table on the V 48 is mounted on a preloaded taper roller bearing. Maximum gear width for spur, helical and herringbone gears is 30". Base dimensions are 94" x 124", height, 126". Magnetic chip conveyors are optional equipment on all models.

All models except the V 48 are available with dual cutting heads. The two cutting heads are independently adjustable for correct angle, and the top head may be adjusted for height. The use of two cutters materially decreases cutting time. With a herringbone gear each cutter cuts one helix face so that both helices may be cut simultaneously.

In addition to the dual cutter heads each cutter is available in a new form—actually two cutters in one. This cutter,

though of one piece construction, has a wide groove in its center section giving the effect of two separate cutters providing two shaving zones on the gear. Each shaving zone guides and steadies the other shaving zone.

### Instrument for checking wire drawing dies

The new AO-Elder Die-Angle Scope, an optical instrument especially designed for measuring entrance angles of wire drawing dies, has been announced by American Optical Co., Instrument Div., Dept. BB, Buffalo 15, N.Y.

It is said to permit even unskilled operators, with only a few minutes instruction, to read entrance angles to an accuracy of + or - 10 minutes of arc. The die is not damaged in any way. Multiple angles and poor polish are obvious immediately. Every size of carbide wire drawing die can be measured accurately—from the largest down to dies as small as .005".

## HOT MELT PLASTIC COATINGS

for GEARS

• TOOLS •

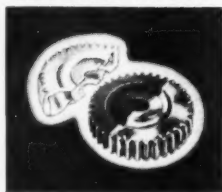
PRECISION  
PARTS

BEFORE



Dip

SECONDS AFTER



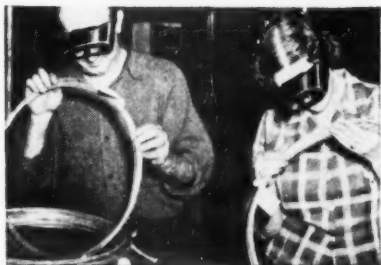
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Dept. 14, New York 17, N. Y.

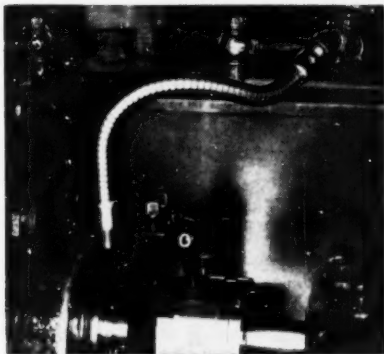
## JOHNSON FLEXIBLE METAL OILFEED AND COOLANT LINES FOR CONVEYING

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OILS AND LUBRICANTS**

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WHEN BENT



Write for Bulletin O.F.L. No. 1



**JOHNSON METAL HOSE, INC.**  
100 SPERRY ST. WATERBURY 20, CONN.

## Cope Saw drill bit versatile tool around home or shop

One of the most versatile tools for carpenters, electricians, mechanics, farmers, home craftsmen and many others is claimed by the International Twist Drill Corp., Dept. BB, 7th & Wyandotte, Rm. 981, Kansas City, Mo.

Recently introduced to the industry, this tool is said to be ideal for cutting, sawing, reaming and drilling. It fits any standard  $\frac{1}{2}$ " or  $\frac{3}{4}$ " electric drill or may be used with a slow speed drilling machine.

Designed to drill its own starting hole, the upper part of the bit is then used to cut, saw and ream circles, ovals, squares or scrolls quickly and efficiently.

There are three attachable bits, each designed to perform specific functions: 1. The "Wart Hog" all purpose bit for use on light metal, wood, plastic and all general use; 2. The "Python Bit" for use on heavy metal, angle iron, pipe, transite and similar materials; 3. The "Porcupine Bit" designed primarily for use on wood.

Simple to operate, a hole is drilled and the drill pushed on through to the cutting section. By applying side pressure, along with a sawing action, the tool cuts along a given line.

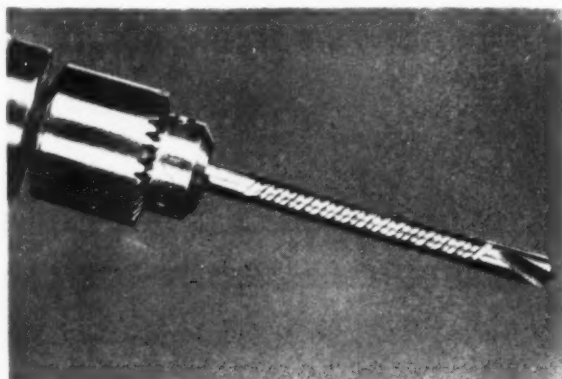
It is constructed of abrasive resistant high speed steel with flutes ground from solid. Though the tool is said to be long lived, the manufacturer will re-sharpen it when dull, free of charge.

### Air-controlled vise

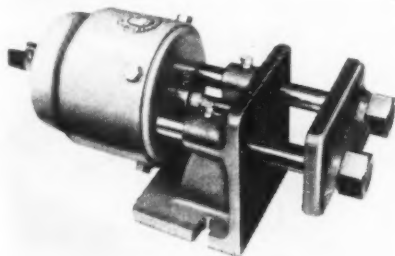
The Wilson Bohannon Co., Dept. BB Marion, Ohio, recently announced that it is marketing a new air-controlled vise. The new vise is said to be simple and may be synchronized with operations of vertical and horizontal milling machines, drill presses, boring mills, shapers, and other machine tools. It

is fully equipped with a Bendix-Westinghouse Robotair chamber.

The design of the RIK vise places both the air cylinder and the stationary jaw on the same side of the work piece. This feature results in greater safety and speed for the mill operator. Because the moving jaw is at the end of the



assembly instead of next to the air cylinder, the cutting tool need not pass over the cylinder. As a result, the operator has more room to work safer and faster without putting his hands close to the revolving milling cutter when in-



serting and removing pieces. The RIK may be mounted easily on any machine tool. Its over-all length is 12", while the height of the jaws is 5 $\frac{1}{2}$ " and their width, 4 $\frac{1}{2}$ "; jaw opening, 2" (special jaw



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In 19 sizes, ranging from 4 x 9 x 5 and up.



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WORK LOOSE

Safety tools, spark-proof  
Maximum impact, minimum effort  
Will not gash, mushroom or chip  
Will not damage work. No rebound  
Not affected by oil, gasoline, or common industrial acids.

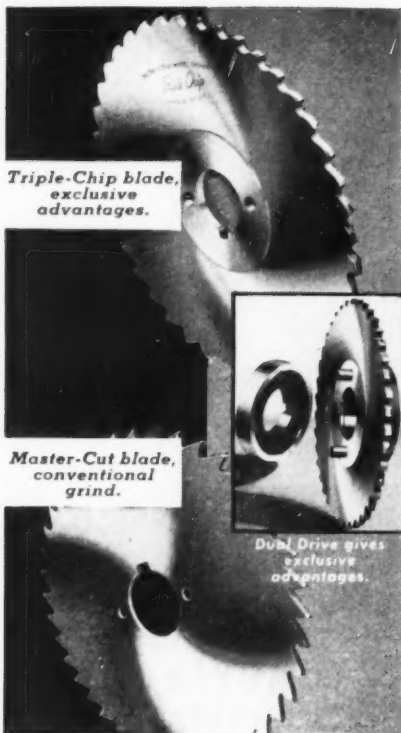
"13 Weights, 5 Sizes, 4 Tip Hardnesses — A Tool For Every Job"  
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**NEW PLASTIC CORPORATION**

1041 NO. ORANGE DRIVE

LOS ANGELES 38, CALIFORNIA





Triple-Chip blade,  
exclusive  
advantages.

Master-Cut blade,  
conventional  
grind.



Dual Drive gives  
exclusive  
advantages.

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MOTCH & MERRYWEATHER  
OFFERS YOU EXCLUSIVE  
ADVANTAGES FOR  
SLITTING AND SLOTTING**



● Let M & M Triple-Chip saw blades give you the higher production-with-accuracy which Industry must attain and maintain today. Also Master-Cut conventional grind with exclusive Dual Drive. Ask your dealer.

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**THE MOTCH & MERRYWEATHER MACHINERY CO.**

715 PENTON BUILDING  
CLEVELAND 13, OHIO



**REMEMBER — IT'S THE COST  
PER CUT THAT COUNTS!**

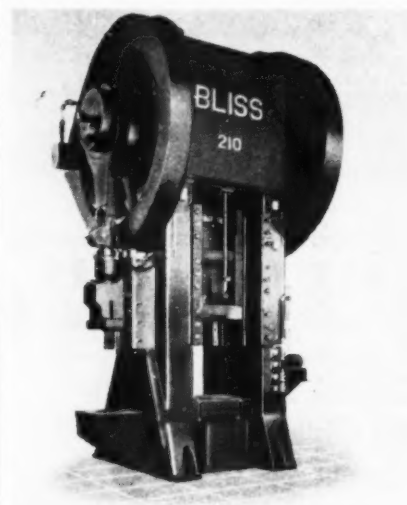
Only  
M & M builds  
**ALL 3:**  
CIRCULAR SAW  
TANK BLADES  
BLADE GRINDERS

opening of 6" available); RIK vise is supplied with either a Type 9 BW Roto-chamber, which gives a clamping force of approximately 8 times the air line pressure, or a Type 12 which develops 11 times the air line pressure.

**Bliss trimming presses**

Development of a new line of trimming presses, featuring the streamlined box-type crown construction, is announced by E. W. Bliss Co., Dept. BB, Canton, Ohio. These presses are especially designed for rigidity and quietness of operation.

The single geared presses in the line are of four-piece frame welded steel construction with twin herringbone



driving gears running in oil and equipped with rim-type, oil tight gear guards.

Among the features of the new Bliss No. 210 trimming press illustrated are an air counterbalance concealed in the uprights, automatic lubrication and the Bliss fast acting, cool running friction type clutch. Another important feature of this press is the friction clamp slip type knockout which prevents accidental breakage of dies, or other parts, by permitting the friction clamp to slide on the knockout bar whenever the bar

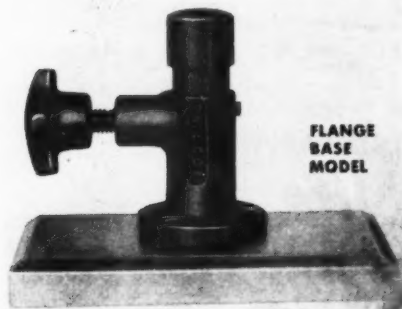
has not been adjusted to the proper height.

The press operates at a speed of 35 strokes per minute with ram capacity of 440 tons. The slide has a 16" stroke with a motorized adjustment of six inches, and the trimming attachment has a 10" stroke with a 4" adjustment. The press is 18' high, and has floor space requirements of 94" x 86" and weighs approximately 98,000 lbs.

### Ready made spring jack developed by Lodding

A standard model spring jack for all purpose use in metalworking plants is now being manufactured by Lodding, Inc., Dept. N 67, 79 Beacon St., Worcester 1, Mass., fixture and detail manufacturers.

The new jack is designed as a versatile work support for materials or parts being machined. Standard in design and usable in many ways, the Lodding jack



makes it unnecessary to design and build special jacks for many jobs, it is claimed.

Operation of the jack is simple. The plunger, actuated by the spring, makes contact with the work without requiring manual pressure. After contact is established, the plunger is locked by the hand operated screw. The hardened shoe registers against the tapered section of the plunger, preventing any movement.

A dust cap on the jack protects the working mechanism against chips and dust. All parts are coated with Parkerized jet black finish and will not rust. Plunger and shoe are made of hardened and ground tool steel.

Triple-Chip  
segmental  
type,  
11" to 84"  
dia.

Triple-Chip  
solid high  
speed steel,  
8" to 20"  
dia.

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MOTCH & MERRYWEATHER

### GIVES YOU EXCLUSIVE ADVANTAGES IN CUTTING OFF STOCK FAST AND ACCURATELY

Fast, burrless cut-off of shapes and tubes up to 30" round. Let M & M Triple-Chip saw blades give you the higher production-with-accuracy which Industry must attain and maintain. Ask your dealer.

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PER CUT THAT COUNTS!**

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1/4" a TK blade  
ALL 3:  
CIRCULAR SAW  
SAW BLADE  
BLADE GRINDER

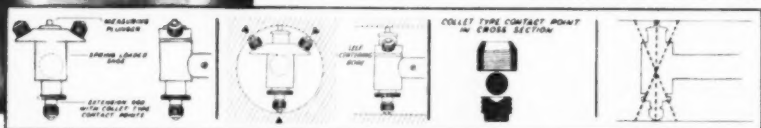


## TUMICO DIAL INDICATOR

### Small Bore and Cylinder Gages

• Give fast, accurate bore measurement without the use of costly plug gages. Actual bore variation shown directly on the Dial Indicator. Using a fixed point in conjunction with a spring-loaded shoe to assure self-alignment in bore they give accurate results in .0005 or .0001 of an inch, .01 or .001 of a millimeter, depending on indicator used.

Collet type contact points used on extension rods and shoe (Fig. 3). If flats appear on  $\frac{1}{16}$ " balls, unscrew collet and rotate ball to a new face or replace ball completely. Measures  $\frac{1}{2}$ " to 36" bore and within  $\frac{1}{16}$ " of bottom of a blind hole. Write for catalog.



To use, rock measuring points over axis of bore to show minimum or actual reading from true perpendicular position in bore. Oversize, wear, ovality, taper, etc., are shown at once.

To measure actual size of cylinder bore, set gage to size with cylinder of known diameter or use micrometer measurement over the fixed and moving measuring points.

TUBULAR MICROMETER COMPANY • BOX 70, ST. JAMES, MINNESOTA

## Stadoil DIAMOND LAPPING OIL

# *doubles the life of diamond wheels*

Here's the lubricant that removes all gum or glaze, and keeps wheels from loading. With Stadoil, no pressure is needed in sharpening. Thus, wheels and cutters last twice as long. You get extra fine tool edges, free from scratches.

Stadoil is recommended by all diamond wheel manufacturers for carbide tool grinding. It's also an excellent carrier for diamond dust. Over 6000 industrial users. 18th year. Sold in half-pint to 50-gallon quantities. Order from your industrial distributor, or if he can't supply, order direct from factory.

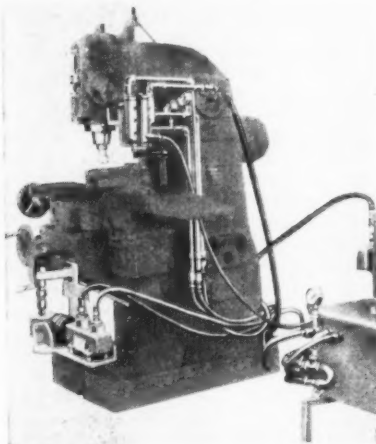
For information, write Dept. 3,



**STADOIL MANUFACTURING CO., EL MONTE 3, CALIF.**

### Hydraulic copying machine

A new Bondycop hydraulic copying machine for use on milling machines has been introduced by Morey Machinery



Co., Inc., Dept. BB, 410 Broome St., New York 13, N.Y.

This attachment is said to permit the machining of complicated shapes, turbine blades, molded parts, plastic shapes, etc.

### Air-Mite micro model cylinder has 1" stroke, 75 lb. thrust

Air-Mite, 4417-G W. Carroll Ave., Chicago 24, Ill., manufacturers of air

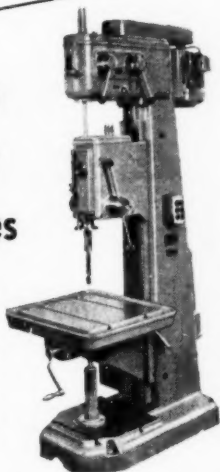


cylinders, air arbor presses, and similar material handling equipment, has announced the addition of a new micro



### ALFING Heavy-duty drill presses

**Quick changeover from job-to-job** on short or long run heavy-duty drilling production is assured by easily adjustable head and table on ALFING DRILL PRESS.



Crank raises or lowers table; headstock moves 6" up or down by hand on scraped ways. Easy-to-reach controls cut handling time, too. 9" quill-supported spindle stroke, driven by 3.6 h.p. V-belt motor. Motor speed 900 rpm. Drilling capacity of 1" in steel; 1 1/4" in cast iron. 8 spindle speeds from 150 to 1640 rpm. Drilling feed by hand or power. Table surface 26"x28". Scraped base plate may be used as table for extremely bulky work pieces. Distance between spindle and table, 23" max.; spindle and base plate, 25"-40". Write for descriptive literature.

Engineered servicing and stock parts within 48 hours from Orban Service Centers in Newark, Detroit, Cleveland.

## KURT ORBAN COMPANY, INC.

205 East 42nd St., New York 17  
19450 James Couzens Highway, Detroit 35  
4220 Prospect Ave., Cleveland 3  
1939 Santa Fe Avenue, Los Angeles  
Distributors from Coast to Coast

Canadian sales by European Machinery Ltd.,  
11 King St. W., Toronto

## NEW PRECISION DIE SAWING & FILING MACHINE

The FM-200 Precision Die Filing & Sawing Machine has been designed for the manufacture of small and intricate dies. Only tension files are being used. They are held under tension between upper and lower file holder arm guaranteeing absolute straight filing or sawing. The upper arm is hinged to enable the operator to swing the arm upward in order to inspect the die. This way the file—which is fastened in the lower holder arm—stays always lined up and does not require re-setting after each inspection. The work table can be tilted in all 4 directions up to 20° in order to file and saw tapers. All moving parts are hardened and ground for perfect fit. Variable speed drive permits any speed from 110 to 330 strokes per minute.



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# TOOL PROBLEM

Columbus Die-Tool has been solving tooling problems for over 45 years. Expert designers and builders of all types of tools and special machinery. Write us today!

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### and Machine Co.

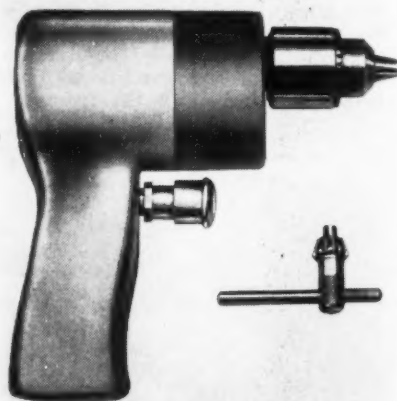
P. O. BOX 750 • COLUMBUS, OHIO

model cylinder to its line of small sized air cylinders. The new model has a one inch stroke and is ideal for use in small jigs and fixtures where size and space limitations are primary factors. These are said to deliver 75 pounds thrust on a 100 line pressure. Equal ram pressure is given at any stroke point on the new micro model cylinder 1" stroke.

These small air cylinders are for ejection or injection of work, for holding or clamping parts for welding, riveting, drilling, bolting, etc., or for any other processing or assembling operation where speed and accuracy, combined with minimum labor cost, are important. Any number of cylinders, from one to several hundred, can be operated by a single control valve. Cylinders are machined from solid brass bar stock, eliminating the possibility of rusting, or pitting of cylinder walls.

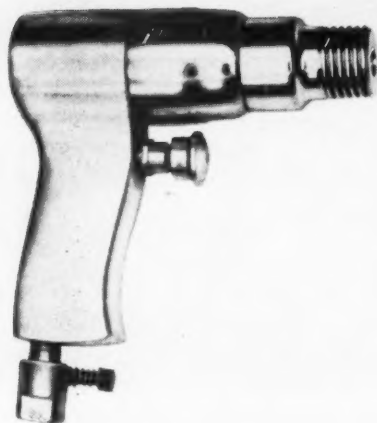
### Pneumatic drill, hammer

The Brown Tool Mfg. Co., Dept. BB, 9422 Trenton Ave., St. Louis 14, Mo., manufacturer of portable pneumatic equipment, announces the completion of



a new 1/4" pneumatic drill, and the BXB pneumatic riveting hammer.

The eight vane motor of the drill is said to produce a very high torque on



pressures as low as 28 lbs. at a speed of 2,600 r.p.m. By eliminating conventional type gears and bearings, runout is said to be low. The motor and gear box assembly are manufactured as one complete sealed unit. Weight is two lbs.

The hammer stresses simplicity with only three moving parts, yet is claimed to be powerful and fast operating. The air pressure is regulated with an interchangeable meter control valve. Foreign particles in the air line will not interfere with operation. A larger piston facilitates short powerful strokes.

#### Fully insulated electrode holder

The Caddy Type B fully insulated electrode holders, 300 and 400 amp., are said to give welding operators cool operating, high conductivity electrode holders. They're made by Erico Products, Inc., Dept. BB, 2070 E. 61st Place, Cleveland 3, Ohio.

The welding cable is carried through the holder body and attached to a completely replaceable beryllium copper jaw by means of a cadweld solid copper connection that cannot be overloaded, cannot melt out or burn out, and can neither loosen nor corrode, the manufacturer claims.

The cadweld connection will carry



Model WD-10 Wet or Dry 10" Carbide Tool Grinder.

HAMMOND Carbide Tool Grinders will soon pay for themselves through greater wheel economy, longer tool life and faster grinding. AMERICA'S MOST COMPLETE LINE.

6", 7", 10", 14" Wet or Dry—also Chip Breaker and Diamond Finishing Grinders.

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*Hammond Machinery Builders*

1014 DOUGLAS AVENUE

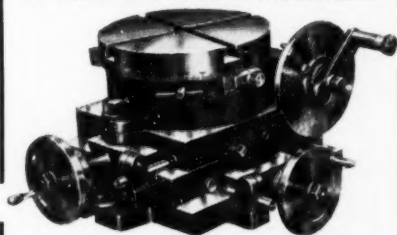
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## The STEVENS Line

SINCE 1925

Showing 7½" Dial Type Rotary Table mounted on compound table No. 1

- Traverse and Circular Movements -

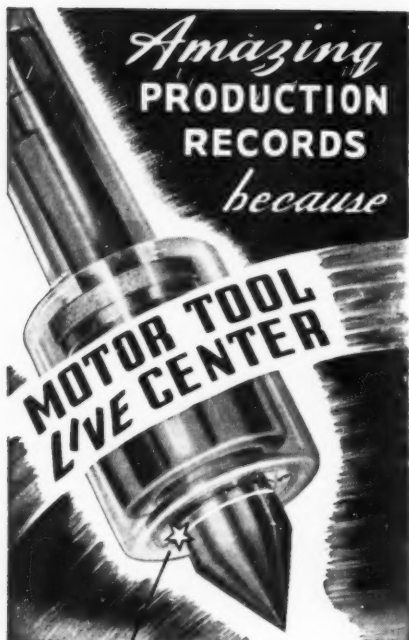


Made in larger size 12" dial type Rotary - compound table No. 2. Either unit usable separately. Five sizes of Rotary Tables. Adjustable tilting tables. Multiple spindle index centers. Screw head slotters. Vises.

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**OVERLOAD  
INDICATOR**

Look for the **RED BAND**

You no longer have to guess whether you are overloading your live center thrust bearings if you use **MOTOR TOOL LIVE CENTERS**. When the load is too great the **RED BAND** around the spindle disappears into the housing. You can see at a glance when overloading occurs. This is an exclusive feature, developed by Motor Tool which cuts repair costs to practically nothing if due diligence is exercised. As long as the **RED BAND** is visible you are running **COOL** and **SAFE**.

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NEW descriptive folder . . . and verified case histories of how **MOTOR TOOL LIVE CENTERS** have out-performed and outlasted ALL other centers on exceedingly tough, continuous-run jobs.

**MOTOR TOOL MFG.CO.**

P.O. BOX 3805 PARK GROVE STATION DETROIT 5, MICH.

Make the Rule  
to Call Motor Tool



more current than the cable itself thereby eliminating the normal holder "hot spot" caused by high resistance mechanical or soldered connections.

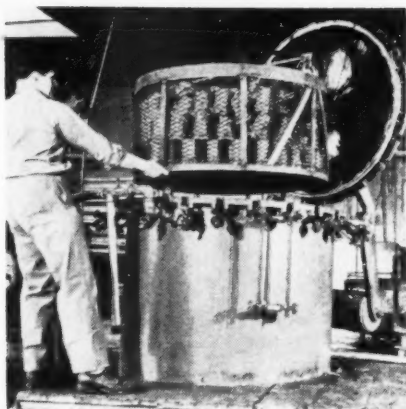
The operator's hand is over insulated cable, air space and ribbed handle, actually 4"-6" from the connection. The ribbing reduces the contact surface between the operator's hand and the handle.

**Mechanized impregnation of  
metal castings achieved with  
self-contained metaseal unit**

A new system that includes everything needed for complete sealing of porous castings is said to have been developed by engineers of the American Metaseal Mfg. Corp., Dept. BB, 30 East 60 Street, New York 22, N.Y. The heart of the new system is a self-contained unit comprising autoclaves, high-vacuum pump, thermostatically controlled wash tanks, a mechanical surging unit and a power operated hoist. Exclusive of the baking oven, the unit occupies less than 40 sq. ft. of floor space. It is used with the Metaseal 19V5 resin.

The new Metasealing machine is designed for one man operation. It is built around a center hub unit which contains the activating hub cylinders; this hub unit mechanizes all functions of the machine, from basket loading through the vacuum pressure cycle and the cleaning surge. This unit is com-





pletely self contained. Built on its own platform, it does not require overhead rails or hoists. Thus, it can be placed anywhere in the shop. It comes completely equipped with valves, gages and piping, so that no erection costs or structural changes are necessary.

Metaseal Plastisol, the cleaning agent

used in the process, is non-inflammable, non-toxic, non-volatile and nonionic.

Castings are run in batch loads, with no individual part handling during the entire process. Basket loading is achieved mechanically and automatically. Indications of impregnant level, overflow and even pore penetration are both visible and measured on a cycling panel. All valves and switches for the entire machine are functionally mounted for immediate accessibility.

The Metaseal method claims to achieve 100% sealing of micropores on a permanent basis. In this method, the resin in monomer form (containing no solvents or other volatile matter) flows into the pores under vacuum and pressure, filling them completely; the entire casting is heated and the resin polymerizes into a hard, infusible material.

#### Drill extractor

Wohnip Eng. Co., Dept. BB, 589 Central Ave., East Orange, N.J., has introduced their new twist drill extractors put up in sets of six, with wrenches, to

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**NEW  
ACME  
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**MANUFACTURERS OF STANDARDIZED DRILL JIG AND FIXTURE BUSHINGS**

# REID

## A Reliable SOURCE for



### THREADED PLASTIC BALLS—Oval and Round

All sizes. Black. For machine tools, jigs, fixtures, etc.



### CLAMPING HANDLES

All steel with plastic hand balls. In single or double offset and straight types in many sizes. Strong. Attractive.



### CAST IRON HAND KNOBS Three Styles

Scalloped, long shank with wrench hexagon and prong types. Many sizes. Finest and most complete on market. Smooth finish. Dresses up product.



### MACHINE HANDLES

Finest quality. Crank, straight and offset malleable types. Also forged crank, solid and revolving types, machined from solid bar stock. High luster finish.



### HAND WHEELS Straight and Dished

Best quality. Both spoke and solid web types. Rims polished to high luster with or without solid or revolving handles.

**REID TOOL SUPPLY CO.**

Muskegon Heights, Mich.

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Please send us FREE copy of 44 pg. catalog, illustrating and describing the REID line of necessary and hard-to-get components and accessories.

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take care of different size drills.

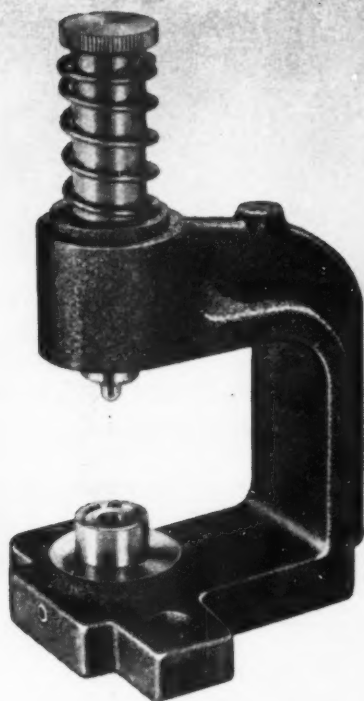
Each drill extractor is stamped, indicating the drill sizes it will take care of. Replacement wires, if needed, may be ordered. The housing is finished in rustproof satin finished blue black.

### Sell aligning sub presses

Price Machine Products, Dept. BB, 929 West 80th Street, Los Angeles 44, Calif., has announced a new series of Paragon self aligning sub presses for use with kick, arbor, air, or punch presses.

These low cost presses are said to increase the production capacity of every type of press by eliminating the need for complicated and time consuming setups for staking, piercing, bending, forming, and assembling operations on small piece parts.

Each operation can be tooled in a matter of seconds and the setup left permanently in the sub press. When a change in operation is desired, the sub



press containing the required setup is put in place on the power or hand press bolster and the production run is immediately resumed.

Alignment, regardless of the inaccuracies in moving parts of the arbor, kick, air or punch press is assured because the ram and lower tool holes of the sub press are line bored to precise tolerances.

#### **Time saving features in Cullman Gripmaster sprockets**

Claiming advance in design and performance, the new Cullman Gripmaster sprocket system is announced by Cullman Wheel Co., Dept. BB, 1344 Altgeld St., Chicago, Ill.

They are said to eliminate reborring, greatly simplifying changes. This is accomplished by using different tapered split bushings or split hub type. They are suitable for a wide variety of applications.

# "RFC" ROLL FEEDS

## PRECISION FEEDS FOR ALL TYPES OF PRESSES



**COMPLETE  
READY FOR  
MOUNTING**

Now you can be sure of non-slip, accurately measured feeding (in thousandths) on your punch presser, either bench or pedestal types. Instantly reversed by merely shifting feed finger spring from one lug to the other! Original setting is maintained as there are no ratchets or pawls to wear. Plan to equip your presses with Roll Feeds. Write today for complete list and data.

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STANDARD  
MODELS**

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# GEAR RACKS

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*Generated for Extreme Accuracy*

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## **SAMSON Offset BORING CHUCKS**

THESE JOB-PROVEN FEATURES WILL  
SAVE YOU TIME AND MONEY

- Quick tool change
- Positive dead-centering
- Precision offset adjustment
- Rugged tool support
- Safety round contour

Complete Boring Chuck  
Accessories Available

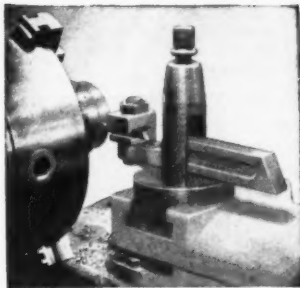
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**LAST WORD**  
WHEEL  
DRESSER



**LAST WORD SALES CO. • 18500 Mt. Elliott • Detroit 34, Mich.**

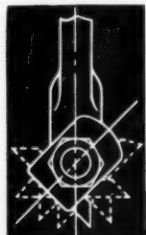
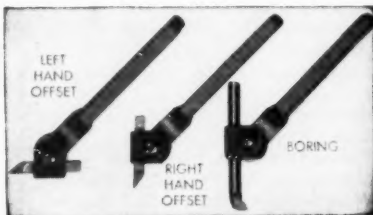


## VERSATILE MULTI-POSITION

One Walton-American can be used in straight and right or left hand offset positions, or any other position around an entire circle (see illustration). All changes may be made at the machine without additional heads or set screws.

## WALTON-AMERICAN Adjustable Tool Holders

Hold with a perfect grip, tool bits, or boring bars in all sizes from  $\frac{1}{8}$ " to  $7\frac{1}{16}$ ", square or round. Besides gripping the tool securely top and bottom, it is held so that no lateral motion is possible. The Walton-Americans are adjustable to bit size, and to any cutting position.



**OTHER WALTON PRODUCTS**—The well known Walton Tap Extractor for removing broken taps; and Repe Pipe and Stud Extractor for removing broken pipes, studs and screws (a product of Walton's affiliate, Repe Tool Company, Inc.)

Send for complete catalog No. 12 of all Walton Tools.

**THE WALTON COMPANY • HARTFORD 10, CONN.**

## BIG or SMALL Up To 16" O.D. - Down To 5/16" O.D. SPECIAL

**Anti-Friction Bearings Are Routine To Us  
ROLLER, BALL OR NEEDLE**

Your requirements for SPECIAL Anti-Friction bearings may look tough to fill, but we'd welcome the chance to look them over.

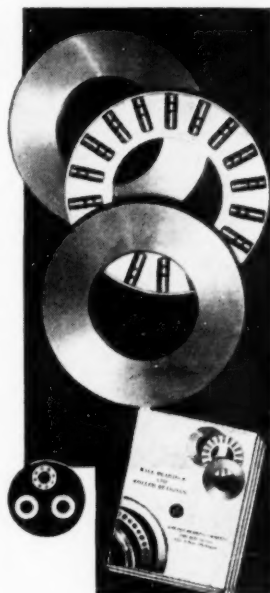
Morton Bearing Company has handled some mighty difficult ones in the past. QUANTITIES . . . from one to thousands.

SIZES . . . from 5/16" to 16" O.D. SPECIAL RADIAL, THRUST or ANGULAR CONTACT bearings made to meet specific customer requirements of load, speed or space limitations.

No matter how unusual, how exacting your specifications may be, SEND THEM TO US FOR SPEEDY QUOTATION AND DELIVERY ESTIMATE. No obligation of course.

### MORTON TYPES OF SPECIAL and STANDARD THRUST BEARINGS

- Flat Races—
- Grooved Races—
- Flat Seats—
- Spherical Seats—
- Banded Ball—
- Double Direction—
- Extra Light •
- Light • Medium •
- Heavy Series •



## MORTON

**BEARING COMPANY**  
200 HILL STREET  
Ann Arbor, Mich.

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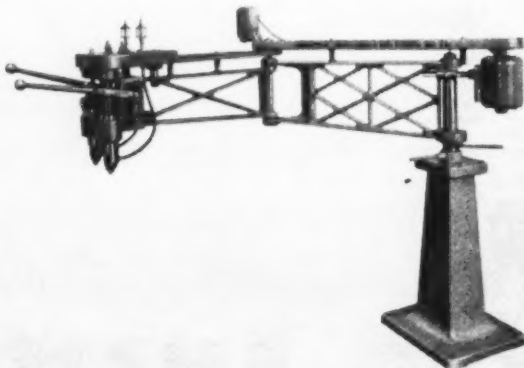
## Ekstrom, Carlson radial arm drills

Ekstrom, Carlson & Co., Dept. M-3, 1400 Railroad Ave., Rockford, Ill., has recently added a number of double spindle (Type DS) models to their line of radial arm drills. They are said to be especially designed for the aircraft industry and particularly adaptable to their production requirements.

Similar in design and general appearance to their earlier single spindle models, the type DS machine is available in two sizes with three models of each. All six have a fixed center-to-center distance of 6" between drill spindles, and also the following identical specifications: dual spindle speeds of 5000 and 8000 r.p.m., maximum vertical spindle travel of 4½", maximum vertical turret post adjustment of 6", drill

chuck capacity of 0-¾", and 1 h.p. spindle drive motors.

The ECCo No. 30 DS incorporates a 30" radial reach, while the ECCo No. 71DS reach measures a full 71". Any of the above models can be supplied with a gravity feed lubricating system for fast drilling in metals.



## Get a better "SURFACE GRINDER" job at less cost

ORDER DIRECT on our 10 day money back guarantee.

**RADIUS DRESSER \$39.00**

Diamond \$7.00

**ANGLE DRESSER \$44.00**

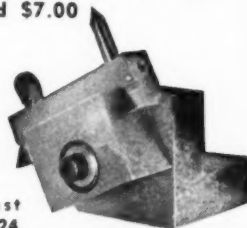
Diamond \$7.00



Hardened shaft—Bearing adjustable for wear.  
Diamond always perfectly centered.  
Easily set adjustable 180° stops.

10" Wheel size for DeALL and NORTON Grinders — \$44.00, Diamond \$7.00.

SPECIAL 14" Wheel Size \$95.00.



Ball Thrust Bearings. 24

Precision Ground Surfaces. Can be set very accurately with a Protractor. Works underneath the wheel. Large bearing surfaces.

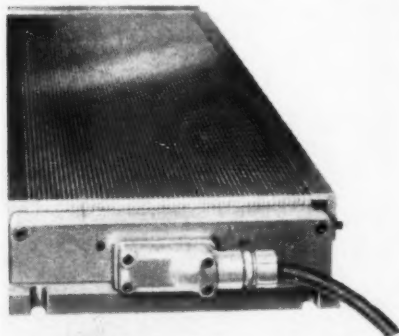
## THE "MIGHTY MIDGET" LINE

SPERMAN METAL SPECIALTIES • 2199 EAST 21st ST. • BROOKLYN 29, N. Y.



### Sundstrand Power-Grip chuck

A magnetic chuck, featuring multiple poles for full work surface holding area, has been added to the line of Power-Grip chucks manufactured by



the Sundstrand Magnetic Products Co., division of Sundstrand Machine Tool Co., Dept. BB, Rockford, Ill.

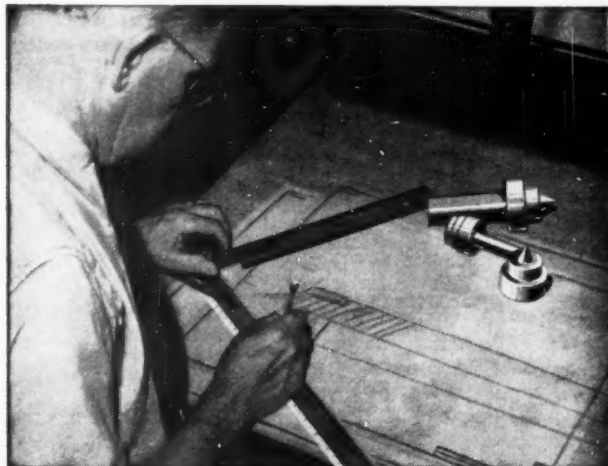
This chuck has closely spaced separa-

tors which are of .050" wide brass separated by a  $\frac{1}{8}$ " wide mild steel spacer. The 100% silver brazed construction results in a rigid base for precision grinding. The full work surface holding area is ideal for holding large quantities of small, thin parts having small areas of contact with the chuck.

### ABC introduces new machine for high speed production of small die castings

A new  $1\frac{1}{2}$  lb. zinc die casting machine, designed for smaller castings and short runs, has been introduced by the ABC Die Casting Machine Co., Dept. BB, 339 West 112th Place, Chicago 28, Ill. According to the manufacturer, this machine was specifically designed for those companies whose needs do not require a large machine, yet who have need for fast cycling equipment to produce small sound castings and for economical short run production.

The machine is air-operated and is capable of a free cycling speed in excess of 1000 shots per hour. Features of

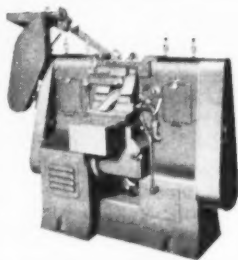


### Engineered Live Centers

... A properly designed Live Center is one of the fundamentals of setting up a job and requires a specialist's experience. Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action that compensates for expansion due to heat shock and excessive thrust loads—reducing wear to a minimum. Send us your blueprints and specifications—we will see that your job is set up with the right Live Center. Standard shanks with Morse taper carried in stock.

**STURDIMATIC**  
**TOOL COMPANY**  
3502 F STREET • DETROIT 16, MICH.





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**OF COTTER PIN HOLES IN SCREWS, BOLTS, ETC.**  
**The KENT Duplex DRILLER**

Two drills move toward the center. One drill then withdraws and the other completes the hole. Parts can be drilled and countersunk at the same operation. Semi-automatic or full automatic feed. Write for illustrated descriptive literature.

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 Drillers - Threaders - Slotters - Countersinkers - Bar Pointers



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**NO MORE COSTLY JIGS**

*on small production jobs with*  
**Troyke Worm Wheel Operated Tables**



**Size:**

9 - 12 - 15 - 18 - 21 - 25  
 See your dealer or write  
 for Catalog No. 17.

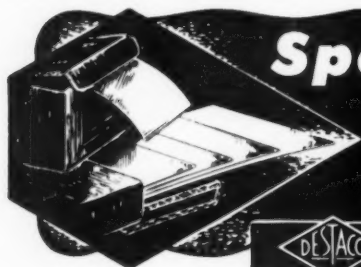
Fully illustrated showing  
 all models and  
 applications to various  
 work.

**TROYKE MFG. CO.,**



Drilling attachments can now  
 be furnished for Worm Wheel  
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**DESTACO**

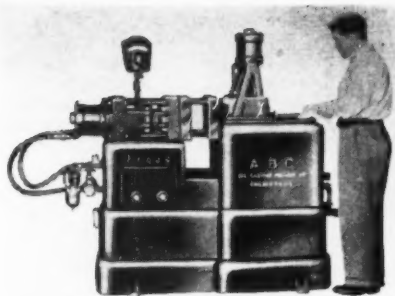
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Made from selected steel or brass, rolled to precision limits, oiled to resist stain and rust, free from burrs. Twelve assorted thicknesses .001" to .015", sheets 6" x 12", coils 120", identified every 6" by thickness and amount remaining on roll.

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**DETROIT STAMPING COMPANY**

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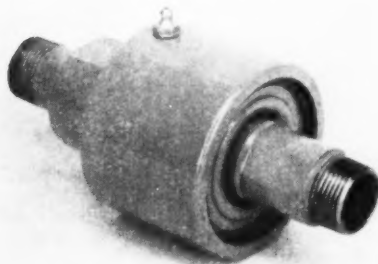


this machine, designated Model 1500, include: an electronically controlled panel; 10" x 10" x 2½" die blocks; four tie bars; and semiautomatic cycling with adjustable timing dwell on opening and closing of the toggle.

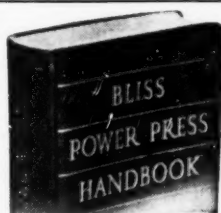
Other specifications: die thickness standard two halves, 5", maximum, 7"; die locking pressure, 20 tons; die opening, 4"; plunger at 1500 p.s.i., 1½"; weight of metal per shot, 1½ lb. zinc; pot capacity zinc, 275 lbs.; operating air pressure, 100-125 p.s.i.; electric power, 110-125 volts a.c. Machine specifications are: weight, 2000 lbs.; height, 66"; width, 27"; length, 80".

#### **Long life, simple maintenance claimed for new rotary joint**

Long life and maximum performance, with minimum servicing requirements, are claimed for a newly designed rotary



pressure joint introduced by Anco, Inc., Dept. 36 BB, One Baker St., Providence, R.I. The joint consists of only 14 parts, including all washers, oil rings, etc. It will convey steam under pressures up to 350 p.s.i. and liquids under pres-



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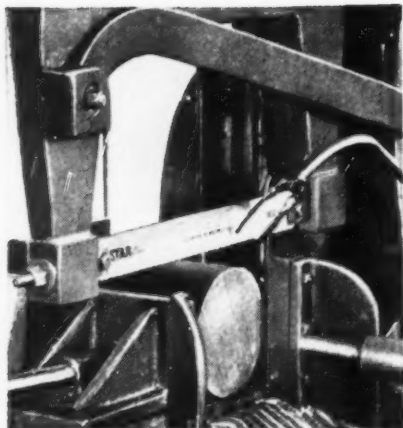
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Screw or Autom-  
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**best metal cutter...  
real cost cutter...**

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To cut your initial power hacksaw blade costs at least 15%, tell your Distributor you want STAR "Moly" High Speed Power Blades.

STAR "Moly" Blades give you an extra dividend, too—cutting that's been proved faster and more efficient.

Over the years, *quality* above all has made STAR Blades industry's *preferred* blade—top quality steel, carefully heat treated, manufactured on specially designed equipment, to give you fast, economical cutting and long blade life.

### **FAST, LOCAL SERVICE from your STAR DISTRIBUTOR'S STOCK**

STAR "Moly" Blades are sold only through recognized Distributors—the men you know and have confidence in, the men who have inventories on hand to give you fast delivery where and when you want it. It is wise to buy whatever you can from your recognized Distributor.



**CLEMSON BROS., Inc.**  
MIDDLETOWN, N. Y., U. S. A.

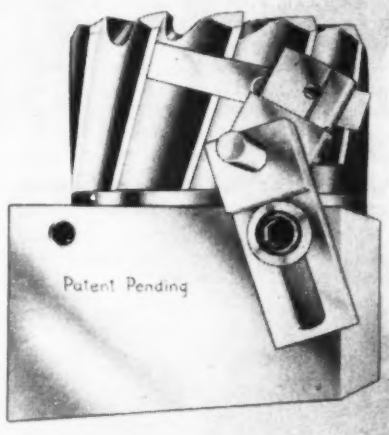
Makers of Hand and Power Hack  
Saw Blades, Frames, Metal Cutting Band  
Saw Blades and Clemson Lawn Machines.

sure up to 3500 p.s.i., while rotating at high speeds. Equipped with a self adjusting wear take-up, the units have single or double race ball bearings. The self lubricating rotary seal and its mating part are so designed that efficiency of the sealing members cannot be affected by any misalignment or eccentricity up to 10°. An auxiliary seal prevents any loss of grease or condensate past the bearing. It withstands temperatures from -100° to +600°.

### **Sharpening attachment**

The Westcott Chuck Co., Dept. BB, Drawer 270, Oneida, N. Y., has announced its "Wesgan" product for grinding and sharpening the teeth of shell mills, side teeth of side milling cutters and inserted tooth milling cutters.

It is said to convert a surface grinder into a cutter grinder, and it can also

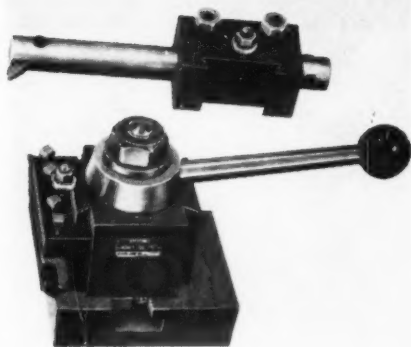


be used on a cutter grinder.

Features claimed include: simplicity of construction; constant duplication of all clearance angles and vertical position for work, allowing operator to see work at all times.

### **Tool post has interchangeable holders**

The Aloris Tool Co., Inc., Dept. BB, 80-82 Fourth Ave., New York, N. Y., announces development of a new tool post



that will fit all lathes regardless of style of compound rest top.

This tool post comes with five quickly interchangeable tool holders, one each for turning, threading, drilling, cutting off and boring. These tool holders can be changed in a matter of seconds by simply sliding out one holder and slipping in another to the exact original preset position without changing the setup. This feature permits the resharpening of the tool bits right in the holder. A stud screw is provided on each tool holder for precision height adjustments, eliminating the use of shims.

The posts are made in three sizes with tool bit capacities ranging from  $\frac{1}{4}$ " to 1" and capacities of boring bars from  $\frac{1}{4}$ " to  $1\frac{1}{2}$ ".

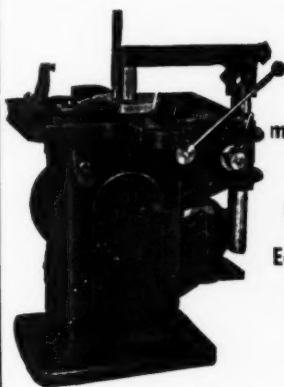
#### Heavy duty drilling machine

This heavy duty drilling machine, made by Leland-Gifford Co., Dept. BB, Worcester, Mass., the No. 3 MVB, can drill holes up to  $1\frac{1}{4}$ " diameter in steel or  $1\frac{1}{2}$ " in cast iron. It has a 24" swing, capacity of No. 3 or No. 4 Morse taper, and from one to four spindles.

Power, hand or hydraulic feeds are available. Power feed has three feed rates, adjustable depth stop and safety slip clutch. The hydraulic feed has either plain or step-by-step controls.

A four speed motor with back gears provides eight standard speeds. A single speed motor with or without back gears or a four speed motor without back

#### "DAVIS" KEYSEATERS



are  
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Efficient  
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Built in 3 sizes for cutting keyways  $1/16$ " to 1" width. Circular upon request.

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#### The LINLEY JIG BORER

Put your small jig  
boring jobs on this  
precision machine



Here's a machine, available at extremely low cost, that will enable you to save your larger machines for larger, heavier work. You'll find it meets your most exacting requirements for precision. Get our accuracy information and you'll see what an outstanding investment this machine represents.

Table movement: 6"x10"; table size, 7"x17 $\frac{1}{2}$ ".

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## UNIVERSAL DRILL BUSHINGS establish new standards of high quality

Universal Drill Bushings, produced at the big, modern plant of the Universal Engineering Company, have been first in industry for more than 25 years. They are accurately machined with superhoned bores from the finest quality steel. They are carefully inspected to insure maximum efficiency and extremely long life. Write today for complete information.

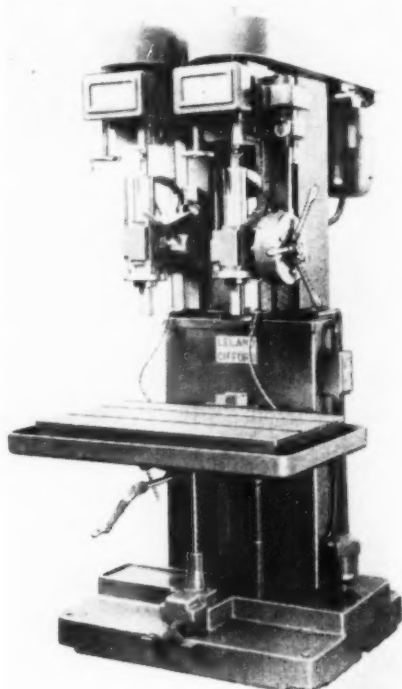


The modern home of finer production tools

**UNIVERSAL ENGINEERING COMPANY**  
FRANKENMUTH 10, MICHIGAN 156-B

gears can also be furnished for other speed ranges.

On multispeed machines, all speed changes, including back gear shifting,



are made instantly without stopping the machine or the operator moving from position.

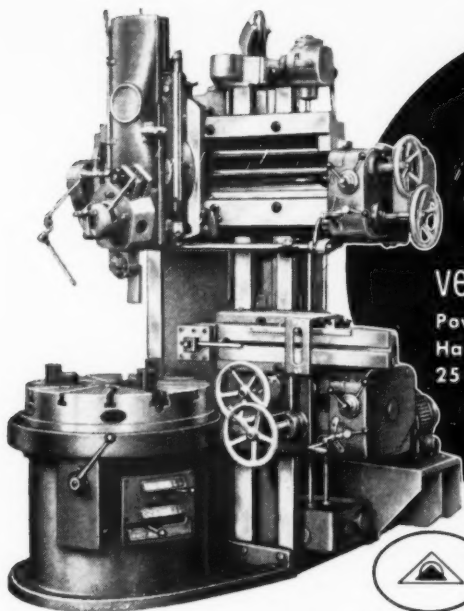
Approximate weight for four spindle machine with four speed motor is 9800 lbs.; floor space is 76"x61<sup>3</sup>/<sub>4</sub>". Over-all height is 92<sup>3</sup>/<sub>4</sub>".

### Magni-whirl utility water bath

Blue M Electric Co., 306-08 W. 69th St., Dept. BB, Chicago 21, Ill., announces the release of its new Magni-Whirl utility water bath (patents pending).

The Magni-Whirl is said to obsolete the need for any stirrers or circulating systems, yet, it provides complete, gentle agitation in all areas of the liquid mass irrespective of how heavily the bath is loaded with test specimens.

An automatic self timing electro magnet below the bottom wall of bath,



# 36" WEWAG

## vertical turret lathe

Power rapid traverse to both heads.  
Hardened, ground gears  
25 hp. V-belt drive

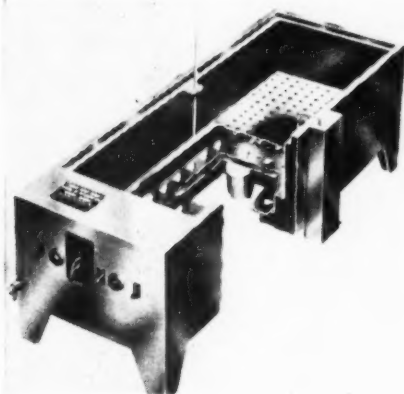
**immediate delivery**

Write or phone  
for full details.



**Parker Machine Company, Inc.**

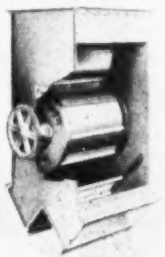
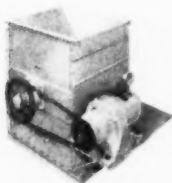
158 Pioneer St., Brooklyn 31, N.Y.  
TRiangle 5-2103 and 2157



periodically pulls the Magni-Whirl flexible circulator plate (a perforated plate) up and down. This built-in automatic stirrer and circulating system automatically maintains temperatures from ambient to 100°C throughout entire water mass to within plus or minus 1/4°C.

### Improved magnetic drum

Improvements and modifications designed to increase efficiency have been made on all Eriez permanent magnetic drums, it is announced by the Eriez Mfg. Co., Dept. BB, Erie, Pa. The drums



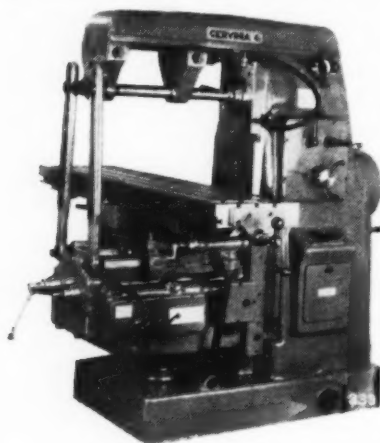
remove tramp iron and medium fine ferrous contamination automatically from materials conveyed in spouts, chutes and other conveying systems not employing belts.

Among improvements claimed for the



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## No. 4 UNIVERSAL MILLING MACHINE



### SPECIFICATIONS:

Morse Taper NST No. 50 - Working Surface 67x15 $\frac{3}{4}$ " - Power feed range: Longitudinal 47 $\frac{1}{4}$ " - Cross 13 $\frac{1}{4}$ " - Vertical 19" - 24 feeds, range 3/64" to 18" per minute - Rapid traverse 60" per minute - 12 spindle speeds, range rpm 16 to 1000 - Motor HP 8.

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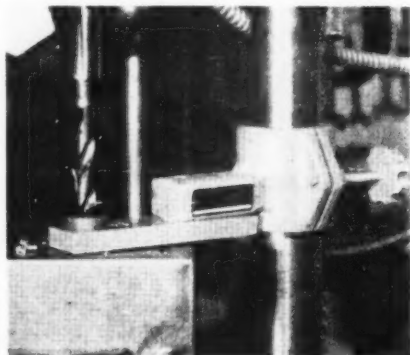
Also available: Lathes, Shaping Machines,  
Milling Machines, Drills.

new magnetic drums are: changeable sheave sizes for various operating speeds; stainless steel shells that resist pitting and corrosion; dust tight construction; lightweight, rigid, cast aluminum sics; adjustable feeder assemblies; smooth running and oil sealed bearings, and extended discharge ducts.

The magnetic drum, which is available in two models with or without housing, consists of a revolving cylindrical shell within which a stationary high powered Alnico V permanent magnet is located. Material is fed into the drum hopper where the flow is regulated by a feeding device. As material reaches the drum, the unit's magnetic field attracts ferrous particles to the revolving shell. The shell then carries the material through the stationary magnetic field. Non-magnetic material falls free from the shell at its natural tangent point, while ferrous particles are held until carried beyond a divider and out of the magnetic field.

### M. E. drill guide

The M. E. drill guide manufactured by the M. E. Engineering Co., Dept. BB, 1158 N. Highland Ave., Los Angeles 38, Calif., is said to give a high degree of accuracy to drilling and reaming oper-



ations without the use of jigs and fixtures.

In any operation calling for a bushing, the guide can be used, ending the tendency of the former to climb. When not required any longer, the equipment can be swung to one side out of the way.



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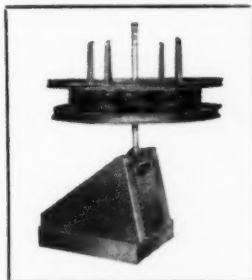
# **MOSLO "SHIFTWEIGHT"**

## **COUNTER-BALANCED WIRE REELS**

Takes the Manual Labor out of loading a Reel with Wire. Just unlock the knurled spindle by a twist of the wrist, tilt the reel assembly 90°, roll coil of wire to reel, lift 6" on to centering arms, release lock by twist of wrist, use spindle as lever to lift, and the Weighted Counterbalance does the rest!

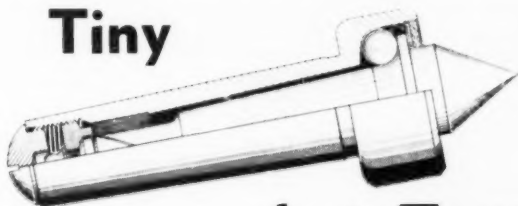
Capacity 300 lbs. — Min. Coil I.D. 10" —  
Max. O.D. — 41" All welded steel construction — Brake Equipped.

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Immediate Delivery  
\$190.00 F.O.B. Cleveland  
**CLEVELAND 15, OHIO**

### **Tiny**



### **but Tough**

RIGID Live Centers eliminate tool obstructing bulk, yet outlast all larger centers on competitive tests.

Made of hi-tensile thru-hardened tool steel, precision ground, with full complement, oversize-ball head and widely spaced oilite guide bearing. Proved for 20 years, recently improved. Get faster, chatter free more accurate performance on your lathes, grinders, hobbles.

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## PILLOW BLOCK BALANCING WAYS

Especially suited for large diameter work, as a sub-base can be made of proper height to give necessary clearance for work. Anderson Pillow Block Balancing Ways are precision built with chilled iron discs which rotate with minimum friction on sensitive special bearings. Many manufacturers have endorsed them for profitable, efficient, static balancing.



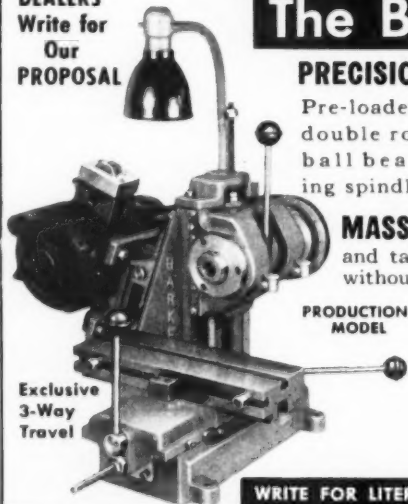
Built in 1,000, 2,000, 5,000, 10,000  
and 20,000 Capacities

Write for Bulletin 5-5

**ANDERSON BROS. MFG. CO., Rockford, Ill.**

Balancing Ways, Roto Checkers, Hand and Power Scrapers,  
Spotters, Hand and Power Hydraulic Straightening Presses

**DEALERS**  
Write for  
Our  
PROPOSAL



Exclusive  
3-Way  
Travel

PRODUCTION  
MODEL

## The BARKER "MILLER"

### PRECISION - PRODUCTION - ECONOMY

Pre-loaded,  
double row  
ball bear-  
ing spindle.

at a rapid rate by  
*inexperienced op-  
erators*. Easy set-  
up for small run  
jobs.

Second to none.

**Priced Under  
\$350.00**

### MASSIVE, HEAVY HEAD

and table to allow fast cuts  
without chatter.

**Complete as  
Shown, Ready  
to Operate.**

You can easily effect a 50% economy  
in the milling costs of small parts with  
this versatile machine.

Designed and built for holding close  
tolerances on big run jobs. Hundreds  
in use in large plants from coast to coast.

The "BUY"-WORD for small parts  
milling jobs is "BARKER MILLER."

**WRITE FOR LITERATURE AND COMPLETE INFORMATION**

**BARKER ENGINEERING COMPANY**

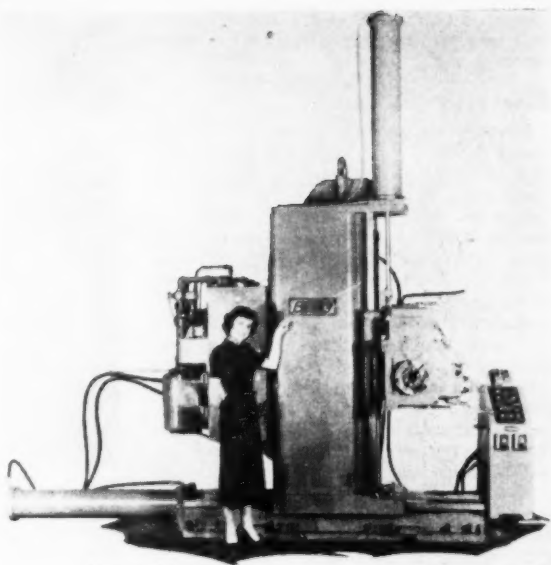
**500 GREEN ROAD  
CLEVELAND 21, OHIO**

### Boring, facing machine

A new machine to handle complicated, irregular profile milling and boring of aluminum, magnesium castings and forgings, cast and rolled armor plate has been developed by Forney's Inc., Dept. BB, New Castle, Pa.

The boring and facing machine is specially engineered and equipped with templates. It is said to be applicable to difficult profile machining necessary in the manufacture of aircraft and armored vehicle parts.

According to Forney engineers the machine is a complete package ready to be placed in service when it leaves the factory. The package may include work holding fixtures, tooling,



**LIBERT MACHINE CO.**  
**GREEN BAY • WISCONSIN**

for **BETTER**  
**PRODUCTION and**  
**MAINTENANCE**  
*at lower cost*

A proved time-saver in any sized shop. Libert's *flexibility* gives you a wider variety of work—clean shearing of flat or formed sheet metal... straight or irregular shapes... inside or outside cuts. Libert *simplicity* means that even unskilled labor soon does accurate work, lots of it *and fast!*

Write for bulletin.

Made in sizes up to 60 in. throat, 10 gauge capacity

**Libert** *Hi-Speed* **SHEAR**

templates and floor plates as required by the user. The machine features a spindle housing as a motor powered unit which moves directly into the work face.

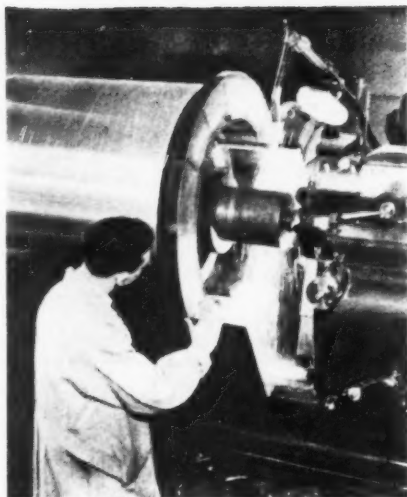
### New vitrified bond

Norton Company, Dept. BB, Worcester 6, Mass., announces a new vitrified bond for their improved vitrified bond grinding wheels.

Named "G-Bond," and identified by the symbols "VG" in the marking, field tests conducted in plants all over the country are said to reveal unusual performance for cylindrical, centerless, surface, internal, gear, tool and cutter, form and thread grinding, and saw gumming.

Norton's new bond can be used in conjunction with many types of abrasive including: 32 and 38 alundum abrasive, regular alundum abrasive, 19 and 57 alundum abrasive.

"G-Bond's" advantages are said to be seven: can do more work per wheel; cut cooler, freer and faster than wheels with other bonds; more pieces per

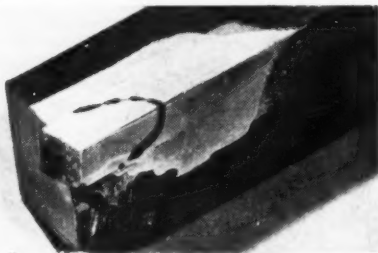


dressing and easier to dress; cover a wider range of jobs; hold shape, therefore well suited for form grinding; hold corners better.

### Spray on dye penetrant

A new dye penetrant test to locate cracks in any solid material is announced by Magnaflux Corp., Dept. BB, 5900 Northwest Highway, Chicago 31, Ill.

The dye penetrant "Spotcheck" is pressure can sprayed on the clean surface to be tested. Then a cleaner is



sprayed on the surface, and removed by a quick wipe. An even coat of white developer is brushed on, and inspection follows in a few seconds. Cracks show up as bright red lines, and pores or leaks in tanks show as bright red spots.



### Multiple Spindle Magazine Feed Power Screw Driving Machines

Latest type equipment for driving screws faster in products requiring two or more screws. These machines operate easily and require very little attention or adjustment once they are put in production.

### Part Feeder



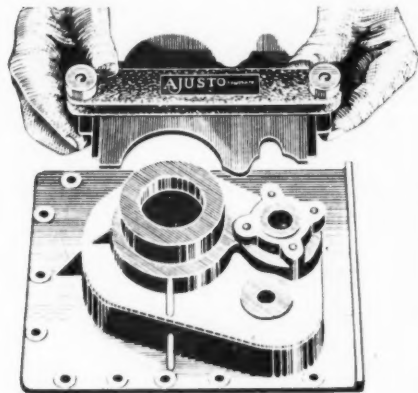
Automatic Part Feeders are adaptable to production jobs requiring the handling of small parts. Parts poured into hopper are arranged and fed down track in proper order. Send sample parts when writing for quotation.

**COOK & CHICK CO.**  
640 SOUTH MILLER ST.  
CHICAGO 7, ILLINOIS

## Ajusto template

Toolcraft Mfg. Co., Dept. BB, 6619 S. Dorchester Ave., Chicago 37, Ill., announce their Ajusto profile template that is said to save much time and money in the development of new products, generating gear shapes, propeller curves, fan forms, designs, etc.

The unit consists of a number of very fine strips of full hard brass, .007" thick by .070" wide. The laminations are held in position by two specially constructed clamps, secured by two thumb screws and springs, by the tension of which the laminations are firmly held, and adapt themselves to the exact shape of whatever medium the instrument is pressed against.



## Micro Height gage

As its name implies, the Micro Height gage is said to combine the easy reading of a micrometer caliper with the scribing features of a Vernier height gage. It comes equipped with a high speed steel scriber which gives it a 2" direct capacity with the scriber inserted in the support with the straight edge down. It is being made by The Fairfield Gage Co., Inc., Dept. BB, 168 Herbert St., Bridgeport 6, Conn.

By reversing the scriber in the support, 1" is gained. This increases the direct capacity of the gage to 3". By using the Micro Height gage on a toolmaker's 1-2-3 block, measurements can be made up to 6".

Having a lead screw that is heat



*New, Improved*

## MAGNA-EYE

*... for Accurate, Effortless Reading of Vernier Scales on Height Gauges and Calipers.*

The New Improved MAGNA EYE is a highly perfected precision instrument. It permits the user to view the hard-to-read vernier scales without eye strain or effort, eliminates errors—no more hit and miss readings; plugging and unplugging eye cups, eye loops or any other magnifying device. Only with MAGNA-EYE is it possible to read the vernier scale with both eyes open—in the same position as your book or newspaper. MAGNA EYE is a time saver in any shop turning out high precision work.

Magnifies four times—MAGNA EYE is not an ordinary magnifier—it is optically perfect glass lens especially designed and developed to meet all requirements in reading the vernier scale—is provided with a focus limit stop to meet the individual vision requirements. It is built to last the life of the tool for which it is designed. In daily use in plants of Westinghouse, General Electric, General Motors, Chrysler, Packard, Ford, Boeing Aircraft, Bendix Aviation and many, many others.

Made in three sizes to fit Starrett, Brown & Sharpe, Lufkin and other tools of similar design—S No. 100 for 6" vernier calipers; S No. 200 for 10"-12" height gages also 10"-18"-24" vernier calipers; S No. 300 for most popular type 18"-24" height gages and 36"-48"-60" calipers.

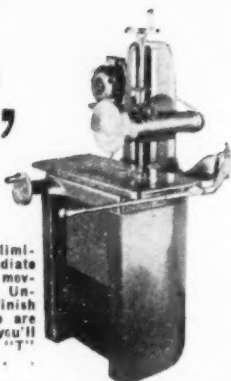
ASK FOR DEMONSTRATION IN YOUR OWN SHOP  
WRITE, PHONE or WIRE

**STEBAR COMPANY**  
711 West Lake Street  
MINNEAPOLIS 8, MINN.

## Suits Your Grinding Needs to a



"T" Square action eliminates usual intermediate table on alternative moving spindle housing. Unusual accuracy and finish are obtained. There are other reasons why you'll like the Crosman "T" Surface Grinder . . . because:



Here's a versatile, handy, accurate surface grinder. Just a few of the uses are: Chip breaker; grinding and sharpening carbide tools, sharpening straight and circular screw machine form tools, also circular file chisels, thread chaser and form surface grinder. Prompt Delivery!

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EAST WALPOLE, MASS.

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**PIONEERS  
and  
PACEMAKERS  
in their line**



—head rivets from smallest to  $\frac{3}{4}$ " diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—sizes to meet all needs—types include Vertical and Horizontal Multiple Spindles

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CE Station, Bridgeport 5, Conn.

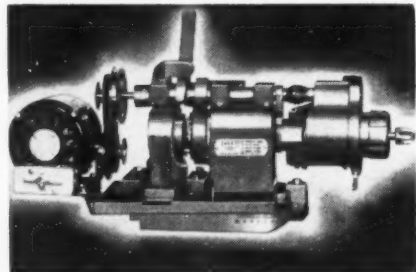


treated and accurately ground, it is possible to replace the scriber with a dial indicator and one can determine quickly and accurately the amount of error on center distances or surfaces so that corrections can be made in the work.

Large graduations on the barrel, from zero to 2", are easy to read.

### Circularity grinding attachment

Detroit Reamer & Tool Co., Dept. BB, 2830 E. 7 Mile Rd., Detroit, Mich., has produced in the model 500 circu-



larity grinding attachment a new device that is said to be faster, easier to handle, with positive control, greater adaptability and rugged construction.

The attachment simultaneously re-



volves the work to be ground and moves it longitudinally back and forth. This simultaneous operation is the result of direct gear drive from drive shaft to collet housing gear and spacer gear.

Standard spacer gears with a follower pin for each flute to be ground provide indexing for 2, 3, 4, 6, 8 or 12 flutes.

#### **Pereco extends electric furnace line**

A new Globar type electric furnace suited for porcelain enameling as well as a wide variety of heat treating operations, known as the Model TF-24, has just been announced by the Pereny Equipment Co., 893 Chambers Rd., Columbus, Ohio. The new unit has a chamber size 36" wide by 48" deep by 24" high for handling either large, heavy items or production quantities of smaller products. It is designed to operate at a temperature of 2400° F. with a work load of 350 lbs. of metal per hour. It is heated by globar elements set on each side of the chambers, from front to back and is powered to give rapid recovery time after the door is



opened or closed during the change of loads.

## **HIGH SPEED PRODUCTION CONTINUOUS OIL GROOVING**

**WICACO CONTINUOUS OIL GROOVER** cuts grooves of all descriptions, internal or external, continuous or intermittent.

Send us samples for grooving. We will return them cut to specifications, with a record of time and cost estimate. No obligation.

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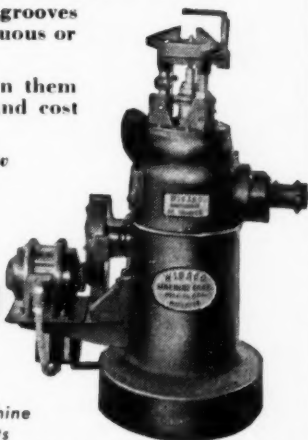
**MACHINE CORPORATION**

**WAYNE JUNCTION, PHILA. 44, PA.**

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*Precision Machinery and Machine Parts  
Roller Bearing Twister Spindles—Spindle Oiling Machine  
Precision Internal Grinder—Screw Machine Products*

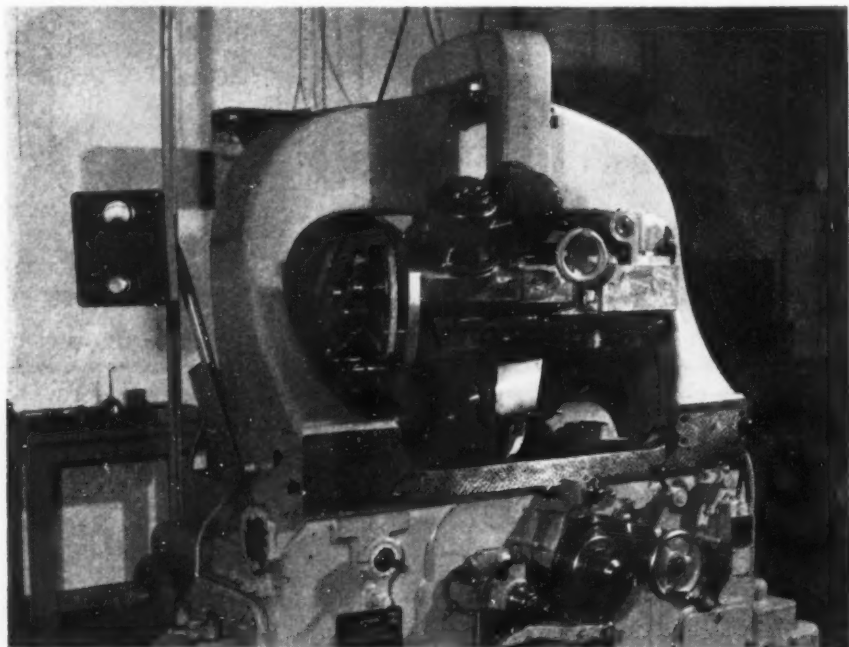
**SINCE  
1868**





## Vard announces major tooling developments

Four major machinery developments have been announced by Vard, Inc., Dept. BB, Pasadena, Calif. All of them, perfected during the past year, are now in full production, and include: (1) hourglass worm grinder; (2) special thread grinder; (3) multiple spindle hydraulic boring machine; (4) hydraulic production milling machine.



All machines were developed to meet specific needs in the Vard plant, long a manufacturer of ball screws, screw actuators, electric motors, electro-mechanical actuators, gears and gear boxes.

The Vard hourglass worm grinder (illustrated) is said to provide an accurate hob and hobbing method for cutting mating gears, producing worms and gears of accurate geometrical shape without recourse to lapping. Electrically controlled microswitches enable auto-

matic reversing and continuation of production of the form as required.

The special thread grinder features a master lead screw which allows precision grinding of all kinds of threads in sizes up to 22 feet in length, without resetting.

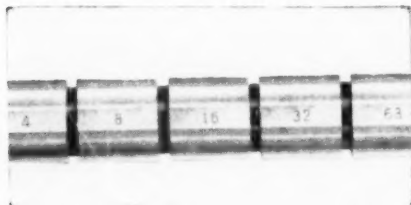
Replacing both turret lathes and milling machines, the multiple spindle hydraulic boring machine performs multiple step boring and facing in one operation, affords higher production,

and maintains consistent tolerances of .0004 on bores, it is claimed. Pressure fed coolant oil is ejected through the center of each spindle, and when necessary, controls still closer tolerances through temperature gradations of the coolant.

Fourth in Vard's machinery developments, is a horizontal milling machine to perform heavy faced milling up to  $\frac{1}{2}$ " cut on No. 4130 heat treated steel. This unit is powered by an air hydraulic system.

## Roughness comparison specimens

A new line of roughness comparison specimens, also known as surface sticks, has recently been announced. According to the manufacturer, Acme Industrial Co., 200 N. Laflin St., Dept. BB, Chicago 7, Ill., these specimens were designed to meet the need for a low



cost, yet practical, accurate means of determining smoothness or roughness of a surface. Simple, easy to use, they consist of various surface specimens individually finished to definite micro inch readings and grouped together in handy finish-comparison bars.

## New steel for screws

A new, free-machining screw steel for making of screws, nuts, studs, bolts, and other small machined products, is now being produced by the open hearth process at Jones & Laughlin Steel Corp., Dept. BB, Gateway Center, Pittsburgh 30, Pa. The steel is furnished in the form of cold-finished bars.

It is said that the J & L "1200" series gives greater uniformity, superior machinability, and a higher quality finish than conventional screw stock.

The greater uniformity of the J & L "1200" screw stock is the result of the closer control of chemistry and temperature and the larger heat size possible in the modern open hearth furnace.

## Cullman Grip master sprockets

Said to be more advanced in design and performance, quick change roller chain sprockets that eliminate rebor-ing, greatly simplifying changes, have been introduced by Cullman Wheel Co., Dept. BB, 1344 Altgeld St., Chicago, Ill.

These features are accomplished by using different tapered split bushings or split hubs. Positive press fits also result.

## THREE POPULAR SIZES NOW AVAILABLE...

**ABENE**

PRECISION MADE  
IN SWEDEN

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• Direct readings in  
.001" from sur-  
face plate to zero.

Easily adjustable  
to compensate for  
wear.

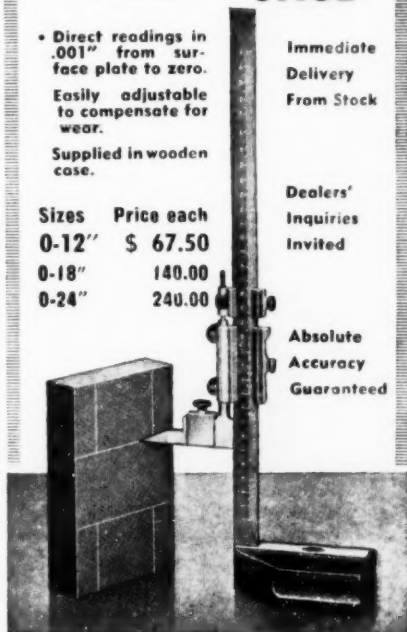
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Sizes	Price each
0-12"	\$ 67.50
0-18"	140.00
0-24"	240.00

Absolute  
Accuracy  
Guaranteed



One of the finest and sturdiest height gauges made, the ABENE is the ideal instrument for measuring and scribing off vertical distances, etc., and indispensable in making jigs and fixtures. All parts subject to wear are hardened, including height scale.

## 0-12" DIMENSIONS

Measuring range	0-12"
Length of scribing needle	2 1/2"
Size of foot plate	3 7/8" x 2 1/4" x 1 1/8"
Net weight	3 1/2 lbs. Gross weight 5 1/4 lbs.

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136 Lafayette St. New York 13, N.Y.

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### Two air impact wrenches added to master line

Two additional sizes of air operated impact wrenches have been added to the line of portable air tools manufactured by Master Pneumatic Tool Co., Inc., Dept. BB, Orwell, Ohio.

Used for driving bolts, studs and threaded fasteners in assembly and sub-assembly operations, the Model M960 has a nominal capacity for  $\frac{3}{8}$ " diameter bolts, and the Model M970 has a nominal capacity for  $\frac{3}{4}$ " diameter bolts. Because of the many varied torque requirements found in different assembly operations, these tools may be applied on sizes of work other than those indicated as nominal capacity.

By the use of various attachments, these impact wrenches are used for running nuts, screws and bolts and for tapping.

The M960  $\frac{5}{8}$ " size weighs 9 lbs. 10 oz., and is  $9\frac{3}{4}$ " long. It has a free run-down speed of approximately 5000 r.p.m. and has a standard  $\frac{3}{8}$ " square drive



for receiving sockets and attachments.

The Model M970 weighs 11 lbs., is  $10\frac{3}{8}$ " long, and has a free rundown speed of 4500 r.p.m. The standard drive is  $\frac{3}{4}$ " square. Both tools operate on air pressures of from 80 to 100 lbs. p.s.i.

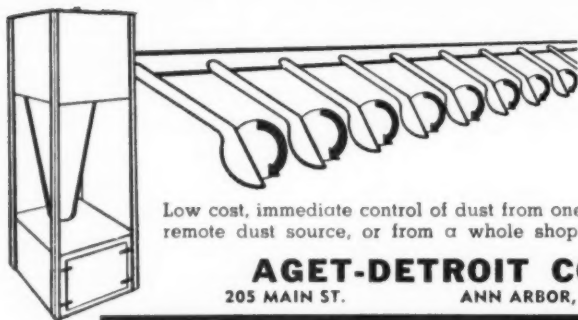
### Flush-out machine

A multiple cylinder head flush-out machine for testing and washing sand and chips from semimachine cylinder heads has been designed by Turner Bros., Inc., Dept. BB, 2625 Hilton Road, Ferndale, Mich.

The cylinder head is placed in one side of the machine, tripping limit switches. When the operator presses buttons, fixture closes, and water pressure is automatically applied to fixture

# STOP DUST

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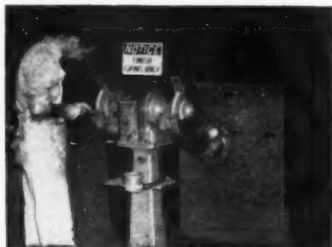


Low cost, immediate control of dust from one remote dust source, or from a whole shop!

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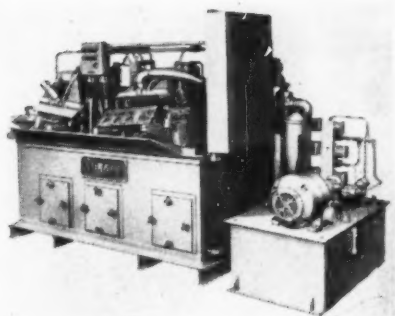
205 MAIN ST.

ANN ARBOR, MICH.



300 cfm to 10,000 cfm  
per unit (22 models)  
standard, pre-tested,  
available from stock.  
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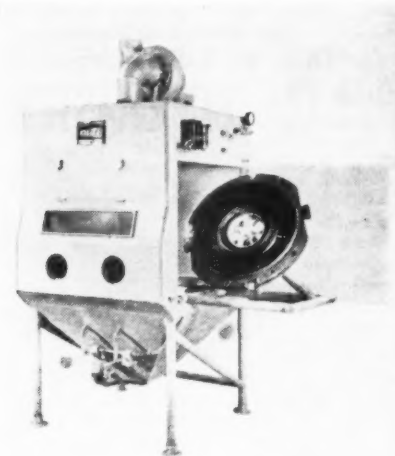


and forced into all unsealed openings in the cylinder head.

A high pressure water system is utilized, flushing through all cylinder head cavities for wash purposes. It is stated that the water pressure is equal to a 3" stream forced 90' into the air.

#### Jet Blast liquid abrasive blasting machine

R. W. Renton and Co., Dept. BB, 814 Addison Rd., Cleveland 3, Ohio, have



announced availability of the new re-designed Jet Blast liquid abrasive blasting machine designed to clean, finish, burr, blend or etch a wide variety of dies, molds, tools and other parts. The liquid slurry is drawn up by siphon injection and propelled from the blast-

## BARGAINS! LONG DRILLS

9" FLUTE  
12" HIGH SPEED 12"

Size	Price Each
1/8" x 12"	\$2.06
9/64" x 12"	2.06
5/32" x 12"	2.06
11/64" x 12"	2.06
3/16" x 12"	2.06
13/64" x 12"	2.19
7/32" x 12"	2.19
15/64" x 12"	2.40
1/4" x 12"	2.40
17/64" x 12"	2.55
9/32" x 12"	2.55
19/64" x 12"	2.75
5/16" x 12"	2.75
21/64" x 12"	3.11
11/32" x 12"	3.11
23/64" x 12"	3.46
3/8" x 12"	3.46
25/64" x 12"	3.81
13/32" x 12"	3.81
27/64" x 12"	4.17
7/16" x 12"	4.17
29/64" x 12"	4.52
15/32" x 12"	4.52
31/64" x 12"	4.52
1/2" x 12"	4.52



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Dress your wheels accurately with long lasting diamonds. Specify holder or nib required. No extra charge.

Carat	Price Complete
1/4	\$ 4.50
1/2	7.50
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1	14.80
1 1/2	19.50
2	24.00
3	34.50
4	52.50

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149 Grand St., New York, N.Y.



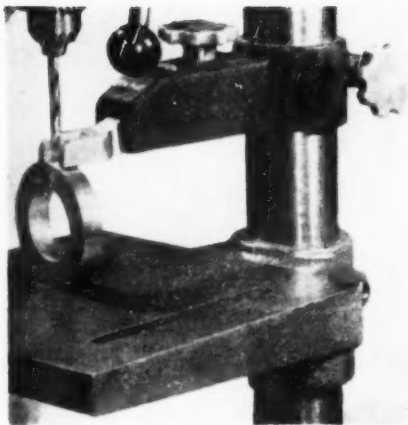
ing nozzle by means of a high velocity air stream. The only moving part within the cabinet is the blower, which is used to ventilate the cabinet.

The machine is designed to handle abrasives ranging from 60 to 5000 standard screen size, and new design permits fast changeover of abrasive slurry. Reversible pump located beneath cabinet effects a complete change in less than 5 minutes. A special method of maintaining the slurry in suspension permits higher concentration of abrasive at the point of work.

Size of abrasive particles, concentration of abrasives in solution, the distance between nozzle and work, and the air pressure supply can be varied.

### Drill press clamp holds odd shapes

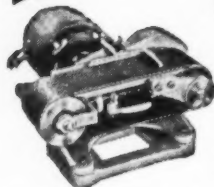
A new drill press clamp, known as the Sta Put Clamp, is announced by Clark & Sawyer, Inc., Dept. BB, 2012 E. 7th St., Los Angeles, Calif. Designed to fit all popular makes and models of drill presses, the Sta Put is said to hold



virtually any shaped object square and secure for accurate drilling. It clamps right on the drill press column and is quickly and easily adjusted. While operator is setting up material for drilling, the fixture is swung to one side. It is quickly swung back into position



### SIMPLEX-M ABRASIVE BAND GRINDER



The precision of a machine tool plus the durability of a workhorse. Complete with 1/2 H.P. Heavy Duty Motor and auto-

matic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

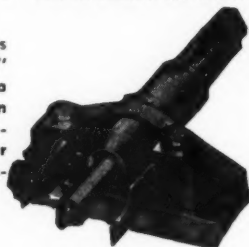
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### Cut Costs on Hole-Cutting! USE THE NEW . . . BOREMASTER

Finished holes  
1 1/2" to 11 3/4"  
diameter to a  
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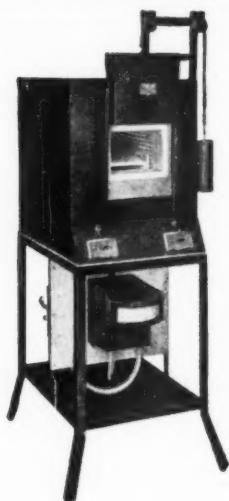
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= COST SAVINGS

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# HUPPERT } PRODUCTION RUGGEDNESS! Model 11 FM FURNACE } LABORATORY ACCURACY!



Consistent temperature-controlled heat output of this heavy-duty electric furnace has found wide acceptance in the tool and die industry. Laboratories too have found trouble-free operation and close temperature control a great asset to their closely budgeted operations. This dependable furnace features—special alloy elements, fully enclosed contacts, snug fitting counterbalanced sliding door, °F. or °C. pyrometer and removable

porcelain tray. Model 11 FM is available in 220 volt A.C., single phase, max. load is 4 KW., maximum temperature range—2000° F. The inside dimensions measure 8" wide by 6" high by 12" deep. The stand is fabricated of 1½" by 1½" x ½" angle iron and finished with two coats of black kinkie finish. A convenient service shelf is 12" above the floor.

Complete with automatic temperature control..... **\$490.00**  
OTHER HEAVY-DUTY MODELS:

Model No.	Inside Dimensions	Max. Temp.	KW	Price
869 FM	8" x 6" x 9"	2100° F.	4	\$530.00
12 FM	8" x 8" x 12"	2000° F.	6	570.00
12A FM	8" x 8" x 18"	2000° F.	9	650.00

Write today for literature on complete line of Huppert Furnaces and ovens in floor and table models.

**K. H. HUPPERT CO.** 6845 Cottage Grove Avenue  
Chicago 37, Illinois  
Manufacturers of Electric Furnaces and Ovens

to hold material securely. It is claimed that the Sta Put eliminates the need for C clamps, vises or V blocks. Tension is obtained by turning the adjusting knob on top of clamp. The pressure fork is adjustable from 7¼" minimum to 8¼" maximum from the drill press column. It is made of aluminum alloy and weighs 3 lbs.

## Precision reciprocating machine

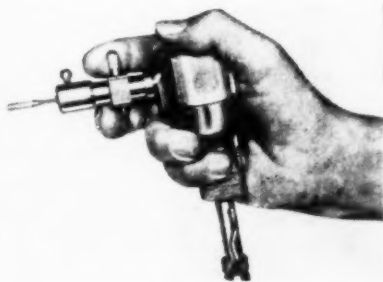
The latest developments in precision reciprocating hand machines are said to be embodied in the new Di-Profiler, announced by Engis Equipment Co., Dept. BB, 431 S. Dearborn St., Chicago 5, Ill.

Driven by a flexible shaft having standard connections, the Di-Profiler has a controlled stroke, variable from 0 to 6 mm (¼"), and a speed of reciprocation that can be varied from 0 to 100 strokes per second.

The Di-Profiler is reported to be especially advantageous for honing and

lapping straight and curved surfaces; for re-working hardened materials; for finishing complicated dies and molds and regular or irregular drawing dies; for precision lapping of small holes.

Simple in construction, the Di-



Profiler weighs less than one pound. It is free from vibration and is easily controlled during operation. A broad range of diamond and tungsten-carbide files, points, blades, scrapers, cutters and other tools has been designed for its many uses.



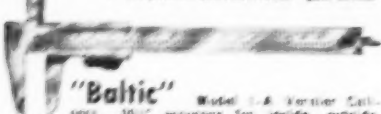
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**"Verdict"** Model 4 Test Indicator "Mill"  
\$22.50 with Universal Stand in Case  
Features: 1. 100% for machine work.  
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**"Verdict"** Model 4 Test Indicator "Mill"  
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**"Baltic"** Model 4.5 Vernier Caliper  
\$16.25 with 5.00 for 5.00 in case. Made in  
Germany constructed from special alloy steel, hardened  
to Rockwell C 50, measuring faces further hardened  
to minimum Rockwell C 50. Clearly engraved cali-  
brations, extra heavy beam and smooth-sliding fit  
of moving jaw insure accurate, positive measure-  
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out the entire scale. Also available  
— German Meister-type Calipers  
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Height Gauge  
\$72.50 Also Height Gauges  
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Made in England constructed with  
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Minimum set-up time. Quick interchangeable jaws and bushing  
plates. Fast upward or downward: clucking, precise centering,  
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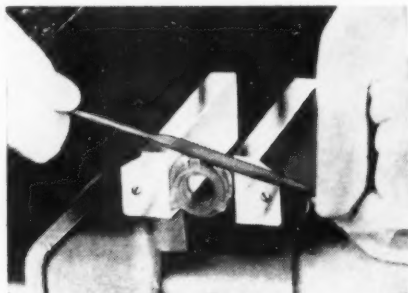
Manufactured by  
**HEUSER MFG. CO.**  
1638 N. Paulina St., Chicago 22, Ill.



### Vise jaw face plates

Nava-mar vise jaw face plates, manufactured by The Kenimar Corp., Dept. BB, Greenwich, Conn., protect soft and finished materials from being marred by the vise jaws.

Nava-mars are made in  $\frac{1}{4}$ " sizes to fit any standard make of vise up to



6". Fastened by a setscrew, they become an integral part of the vise jaw, yet can be removed by a turn of a screwdriver.

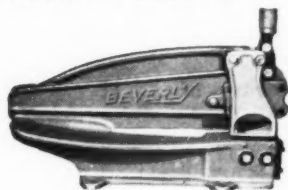
They are made in bronze, aluminum, and fiber or babbitt facings bonded to aluminum bodies. They are accurately machined for use on precision work.

### Development extends scope of diagonal gear shaving

Red Ring engineers of National Broach & Machine Co., 5600 St. Jean Ave., Detroit 13, Mich., have developed a mechanism which when built into a diagonal gear shaving machine is said to provide automatic precision upfeed in selected increments throughout the shaving cycle and automatic return to the proper backlash position for loading and unloading at the end of the cycle. This offers the user the choice of either conventional or diagonal shaving in the same machine.

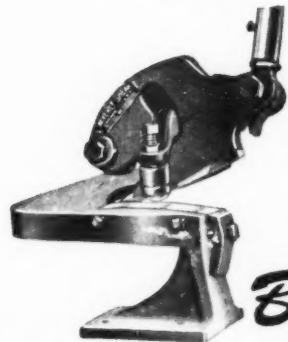
When shaving diagonally the cycle is no longer limited to two strokes. It may now include several cutting strokes each with its own increment of upfeed and, in addition, one or more idling strokes. Cycle time, however, notwithstanding the greater number of strokes, has been decreased due to the very

## Save Time . . . Labor . . . Materials with



### Inside SLOTTER

Makes cuts up to 8" inside edge of sheet. Sharp, clean burr-free cuts always assured. Cap. 16 ga. High strength aluminum alloy body; H.C.H.C. blades.



### Throatless SHEAR

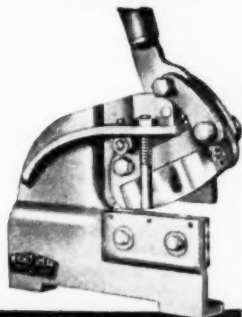
Make any cut—straight, irregular, curved. Exclusive design permits turning work any direction while cutting. 4 models—cap. to  $\frac{3}{16}$ ".

### Slitting SHEAR

New "SS" Series—easier cutting with compounded linkage. 3 models—cap. to  $\frac{3}{16}$ "; trimming capacity to  $\frac{5}{16}$ " mild.

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## BEVERLY metal cutting SHEARS



**Beverly SHEAR MFG. CO.**

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## Boyar-Schultz COPPER HEAD LAPS

... are accurate, fast working and easy to use. They are much less costly than making laps in your own tool room. Because the only wearing part is the inexpensive copper sleeve they are long lasting.

Unlike laps made for specific jobs, they are used over and over again, changing only the sleeves. Adjustment permits correct lapping size to be maintained till sleeve is worn out and replaced with a new one. Thus, with Boyar-Schultz Copper Head Laps you save tool room time and get accurate, speedy lapping.

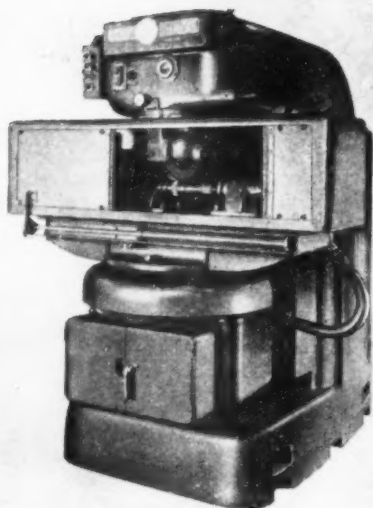
Copper Head Laps and Sleeves are immediately available from stock, in standard sizes— $1\frac{1}{8}$ " to  $2\frac{1}{2}$ " diameters.

### SPECIAL TOOL MAKERS BENCH LAP SET

Consists of seven most commonly used sizes— $\frac{1}{8}$ ",  $\frac{3}{16}$ ",  $\frac{1}{4}$ ",  $\frac{5}{16}$ ",  $\frac{3}{8}$ ",  $\frac{7}{16}$ ",  $\frac{1}{2}$ ", with enameled die cast base.



**BOYAR-SCHULTZ CORPORATION**  
2108 Walnut Street, Chicago 12, Ill.



rapid upfeed and increased cycling speed. Increments of upfeed may be constant or varied, but each is precisely controlled.

The net result claimed is higher gear production, greater accuracy in the product and an increase in cutter life of up to 200%.

### High speed tool bits and cutoff blades

Plew Tool Co., Inc., Dept. BB, Columbia City, Ind., has added to its "Lucky 13" line of cutting tools two other high speed steels they engineered and are selling under the trade names of "Lucky 7" and "Tuf-Cut."

These steels were created through their special process of high and low heat treatments in sequence. From these they manufacture square and flat tool bits and cutoff blades, also hollow mills, form facing tools, counterbores, step reamers, seating tools, formed facing cutters in either spiral or radial relief. They also manufacture finish ground flats, squares, dovetails, and circular tools ground to customers' prints.

Lucky 7 is a vanadium type steel said to have a high tensile strength and a rockwell of C-64 to C-66. Tuf-Cut is

a moly type steel which has also a very high tensile strength and carries a rockwell of C-64 to C-66.

Square tool bits are carried in stock from sizes 3/16" sq. x 2" long to 1 1/4" sq. x 7" long. Flats from 1/4" x 1/2" x 4" to 1" x 1 1/2" x 7". Tools from Tuf-Cut are available ground or unground. Straight cutoff blades are carried in stock from 1/16" x 1/2" x 4" to 5/16" x 1" x 6 1/2". Special size tool bits and cutoff blades can be made to specifications.

### Grizzly steel "MIJ" tables

"MIJ" service tables are used for handling parts, especially small parts, during production. They are made by Pucel Enterprises, Inc., 3746 Kelley Ave., Cleveland 14, Ohio.

Shop boxes are held at the right height and position for rapid handling with less fatigue claimed for the operator. Furnished with or without casters.

Of all welded construction, each shelf has a capacity of 250 pounds. Back and side stops are on all shelves, with drop



fronts for easy sliding of pans and cleaning.

Eight styles; two or three shelves; with or without casters; 23" and 30".

## When so much depends on so little



### Don't settle for less than Chicago "Safety Plus" High Carbon Heat Treated Cap Screws

- For complete hardness from the center all the way out — no soft skin to cause wear or breakage due to fatigue.
- For freedom from scale — cleaner to handle — give a tighter thread fit — have smoother bodies.
- For extra safety — better appearance — ALL at no increase in cost to you.

Your Service-Conscious Industrial Supply Distributor carries a complete stock of our products. Ask him for samples of Chicago "Safety Plus" Heat Treated Cap Screws. His familiarity with your local field conditions enables him to fill your supply needs promptly and correctly. Ask for "Chicago" and get "Safety Plus".



**SCREW COMPANY**  
2507 W. WASHINGTON BLVD. • BELLWOOD, ILL.

You get these advantages with Chicago "Safety Plus" Heat-Treated Cap Screws.

Corners stay sharp... provide positive non-slip wrench grip... No decarburized surface.

Bodies wear longer... nominal diameter remains to size... No decarburized surface.

Threads without nicks... hold tighter in engagement... No decarburized surface.



**"Ateco" Gage  
Handles  
C.R.S.  
Aluminum and**



TAPERLOCK IN EIGHT SIZES  
TRILOCK IN FOUR SIZES  
Prompt Shipment from Stock



**AURELIO TANZI**  
CORPORATION  
Jefferson St. & St. Nicholas Ave.  
BROOKLYN 37, NEW YORK

**"THE ORIGINAL"**  
**MAUSER PRECISION**  
**VERNIER CALIPER**  
**\$14.75 PPD**

NEW EXCLUSIVE CAMLOCK AND  
GIB IMPROVEMENT INSTANTLY  
FIXES SETTING, PREVENTS  
SHIFTING, GUARANTEES  
SQUARENESS OF JAWS.  
THE MAUSER TRADEMARK...  
IS YOUR PROTECTION.

**MONEY BACK GUARANTEE**  
FOR MEASURING INSIDE,  
OUTSIDE, AND DEPTH.  
3 GRADUATIONS  
1/1000" - 1/128"  
1/10" IN BACK

**GEO. SCHERR CO. INC.** 198 LAFAYETTE ST. • N.Y. 12, N.Y.



**DRILL THESE HOLES**  
BY A QUICK, EASY, INEXPENSIVE METHOD  
Your business letterhead will bring literature  
**WATTS BROS. TOOL WORKS**  
Wilmerding, Pa.

## DIAMOND POWDER

Pure - Accurate - Economical  
20 mesh to 0.2 microns

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## JIG BORING

Done to your specifications

**We Have  
12 Jig Borers  
Including the largest  
Pratt & Whitney Made**

**BLOOMFIELD TOOL CORPORATION**  
36 Farrand St. Bloomfield, N.J.

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SPRINGS WHEN YOU  
NEED THEM —  
COMPRESSION OR  
EXTENSION —  
NO LATHE REQUIRED  
Order from your Machine  
Tool Accessory Dealer or  
Write to—

**BLANER SPRING WINDER DIVISION**  
INDEPENDENT MACHINE CO.  
WEST ARNDAL ROAD STOW, OHIO

## ATLANTIC GEARS



SPUR - SPIRAL - WORM  
BEVEL GEARS GENERATED  
WITH PRECISION ON  
MODERN EQUIPMENT

Send Samples or  
Blueprints for Quotation  
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**ATLANTIC GEAR WORKS, INC.**

198 LAFAYETTE ST. • NEW YORK 12, N. Y.

## KENAMETAL CUTTING TOOLS

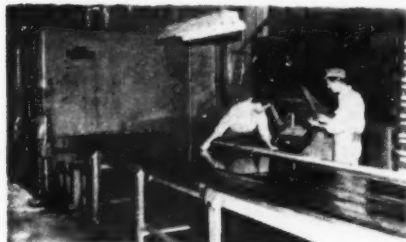
for Increased  
Productivity



**KENAMETAL Inc** LATROBE, PA.  
CEMENTED CARBIDE TOOLS,  
BLANKS, MILLING CUTTERS

### Finishes to within microinch readings applied to metal surfaces

Stainless steel, aluminum, monel, inconel, carbon steel, and other metal or metal alloy plates, sheets, and coils can



be finished to within microinch specifications and in a wide variety of surfaces not available from regular mill sources, according to Apollo Metal Works, Dept. M-1, 66th Place and S. Oak Park Ave., Chicago, Ill.

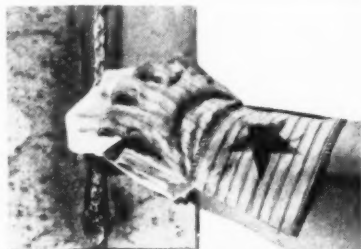
In addition to minute tolerance control of the finish, the processing technique utilizes a scientifically designed

process to cool and clean the metal during polishing. This precludes the possibility of undesirable metallurgical reaction, as well as distortion or warping. Since the coolant is kept in constant flow and carefully filtered, abrasive particles are carried away, reducing grain marks and flaws. Sheet and plate can be finished in sizes to 48" by 144", gages .018" to .375". Coils can be finished in widths from 24" to 36", gages .025" to .050" in standard mill lengths.

### Table model humidifier

The Abbeon Supply Co., 179-23 Jamaica Ave., Dept. BB, Jamaica 32, New York, announces production of the new Sherwood table model humidifier for use in fine offices, homes and for light industrial purposes.

This new humidifier requires no installation, being simply plugged into an electric outlet. It vaporizes moisture through centrifugal force at the rate of better than one pint per hour. It uses no steam or heat and draws electric power equal only to a 30 watt bulb. It



## USE P-O-M AND WIPE OFF SPATTER

When you use Protect-O-Metal, weld spatter wipes off in an instant, with a dry cloth. Protect-O-Metal No. 2 saves 85% of weld cleaning time and labor, pays for itself three times over. Protect-O-Metal No. 2 is a non-toxic, fume-free, odorless compound that weld spatter cannot penetrate. It quiets the welding arc, improves weld fluxing, causes no porosity, makes for more perfect welds all around. Order a trial gallon today. Your money back if compound does not prove entirely satisfactory.

### PROTECT-O-METAL



G. W. SMITH & SONS, INC.

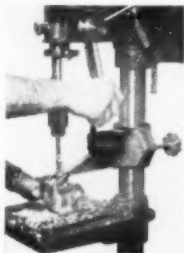
5410 KEMP RD., DAYTON, O.

## M.E. PRODUCTS HELP SPEED PRODUCTION

These accessories are needed in every shop. Pay for themselves over and over again. Send now for complete information.

### M.E. DRILL CLAMP

For holding jigs, fixtures, work to be drilled, reamed, countersunk or otherwise machined on drill presses. Eliminates need for "C" clamps. Easily installed on the drill press column in 2 minutes, the M. E. Drill Clamp is always available; has safe, positive grip. Saves time and money.



### M.E. PRODUCTION CLAMP

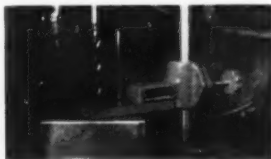


Now you can hold jigs and fixtures on the radial drill, production drill press, milling machine and jig borer . . . positively and accurately. Set-up hours formerly required for bolting jigs and fixtures can now be converted into productive hours. Safe . . . eliminates dangers of loosely held jigs. Installed in a matter of seconds!

### M.E. DRILL GUIDE

Accurate drilling of sheets, bars and castings which necessitate the use of a Drill bushing immediately above the work, is assured with the M.E. Drill Guide. No chatter.

Reduces drill and reamer breakage . . . eliminates "climbing" and distorted holes. This M. E. product and the others described above will increase efficiency in your shop.



Write today for full details and free helpful literature.

**M.E. ENGINEERING COMPANY**  
1158 NORTH HIGHLAND AVENUE  
LOS ANGELES 38, CALIFORNIA

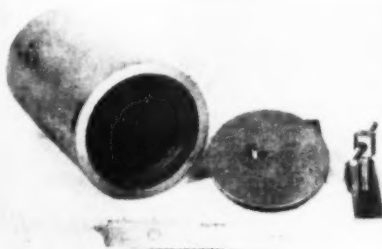


is claimed that a humidifier of this size can easily take care of 1, 2 or 3 rooms in an average home or office. Specifications: 1. Shipping weight, 12 pounds; 2. Diameter, 16", over-all height, 9"; 3. Holds a complete day's water supply at one filling; 4. Humidistat control to turn the unit off and on automatically can be supplied.

### Tungsten carbide lined ball mills

American Electro Metal Corp., 320 Yonkers Ave., Dept. EE, Yonkers, N.Y., announces the commercial availability of improved ball mills for the manufacture of fine powders, particularly of metals, ceramics, and other hard materials.

Longer life of the ball mill is insured by the use of tungsten carbide liners,



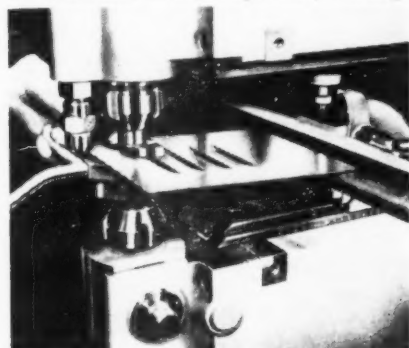
as compared to unlined steel, iron, or other alloys. Because of the inherent resistance of tungsten carbide to abrasion, contamination of the powders being milled by the ball mill is greatly reduced and often completely avoided. These are available, on customer's



specifications, in sizes up to 12" inside diameter and 15" high, with standard assortments of tungsten carbide balls.

### **Tool permits Pullmax machines to cut louvers**

The American Pullmax Co., Inc., 2455 N. Sheffield Ave., Dept. BB, Chicago



14, Ill., has announced a new set of specialized tools for the Pullmax sheet and plate working machines designed to

cut louvers in steel and nonferrous metals.

This attachment permits the cutting and forming of louvers in a single operation. Although the radius and opening of the louver remain constant, it may be cut to any length. The attachment has a swinging type of female die in the lower section which can be moved to either right or left for the final end forming of the louver.

### **Tank type pressure filter**

A tank type pressure filter has been introduced by the Ogden Filter Co., Dept. BB, 4214 Santa Monica Blvd., Los Angeles 29, Calif., for the filtering of chemicals, electroplating solutions, oils, the recovery of wastes and treatment of waste water, eliminating all cloths, papers, screens and pads, it is claimed. Yet, the Ogden unit claims controlled quality filtration and higher flow rates at lower operating costs both in filter material and labor.

A series of synthetic, rigid, porous stone membranes upon which the filter-



## **WHITNEY - JENSEN**

### **METAL WORKING TOOLS**

**FOR 43 YEARS**

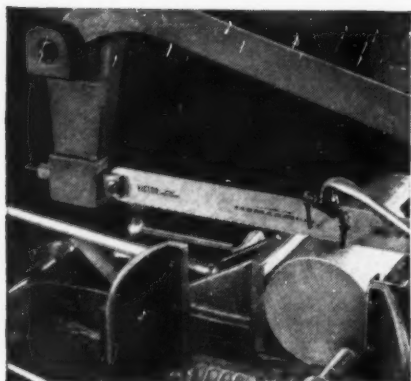
**NOS. 10-11-12**  
**BALL BEARING**  
**PUNCHES**

Punches with portability and power combined. Because of ball bearing screw principle, each develops over 14,000 lbs. punching pressure. No. 11 is identical to No. 10 except for tubular handles which are used for carrying extra punches and dies. No. 12 has higher and deeper throat for punching channels. Bases are available for fixed-position punching.

Capacity (all models)  $\frac{3}{8}$ " through  $\frac{1}{4}$ "

WHITNEY METAL TOOL COMPANY • 115 FORBES STREET, ROCKFORD, ILLINOIS





**15% LOWER INITIAL COST** *with*  
**VICTOR "Moly"®**  
**High Speed Power Blades**

Do your toughest metal cutting jobs efficiently, economically and *right* with VICTOR "Moly" High Speed Power Blades.

You'll reduce your initial blade cost by 15%. Quality steel, carefully heat treated, has made VICTOR Blades industry's preferred blades for over half a century. Your Industrial Distributor will give you free copies of the VICTOR Metal Cutting Booklet which tells you what blade to use for every job. Ask him for it.

**FAST SERVICE**  
*for you from your*  
**INDUSTRIAL DISTRIBUTOR**

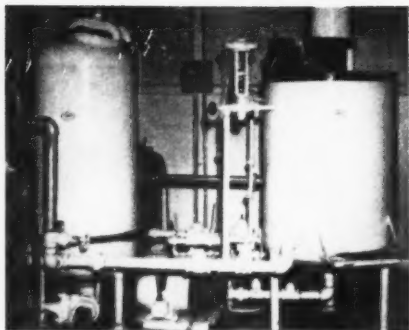
VICTOR "Moly" High Speed Power Blades are sold only through recognized distributors—the men who have stocks on hand to give you fast service when and where you want it. You're wise to buy whatever you can from your recognized distributor.

Ⓜ 1823



SAW WORKS, INC. • MIDDLETOWN, N.Y., U.S.A.

Makers of Hand and Power Hack Saw Blades,  
 Frames and Metal Cutting Band Saw Blades

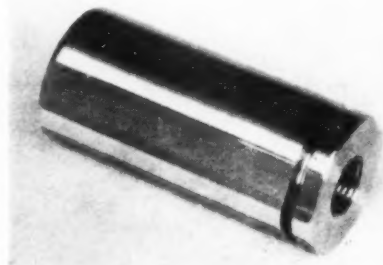


aid coating is deposited provide the retaining surface for the formation of a controlled clarity filtration.

**Anco check valve has tight seal**

Instead of depending on the conventional "O" ring for its seal, the new Anco check valve has a valve seat formed of two hardened steel pieces ground and lapped. Anco, Inc., Dept. 36A, One Baker St., Providence, R.I., says that the device, which consists of seven parts in all, has only one moving part.

Termed ideal for use with accumulators, the Anco check valve prevents reversal of flow of air, oil, water or chemicals, providing control lines with

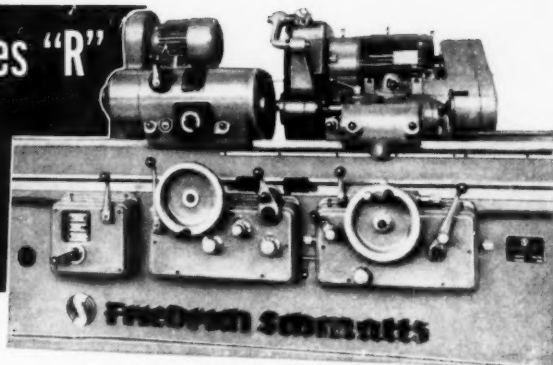


a minimum of pressure drop and positive sealing against return flow. Cracking pressure is five pounds or below at all pressures.

The Anco valve is produced regularly in aircraft and standard pipe sizes,

## Schmaltz series "R"

hydraulic  
cylindrical  
grinders



Known for their...

**High Accuracy**—in-feed stop set by .0002"

**Versatility**—plunge-cut, internal grinding and crowning attachments available

**Sturdiness**

Sizes from 16" x 40" to 32" x 160"



For full details, write, wire or phone

**Parker Machine Company, Inc.**

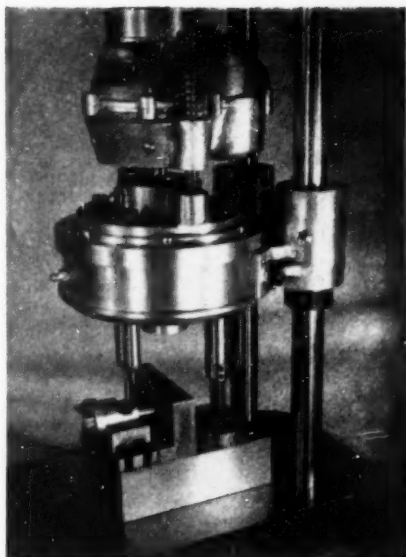
158 PIONEER STREET, BROOKLYN 31, NEW YORK  
TRIANGLE 5-2103 AND 2157

Immediate delivery  
from N. Y. stock  
One-R 16" x 80" with  
plunge-cut attachment.

and can be made to withstand chemical reaction of the materials being handled. These valves are produced in forged aluminum for aircraft and in steel for commercial application. In all sizes, internal passage areas through the Anco valve are in excess of the pipe size being used.

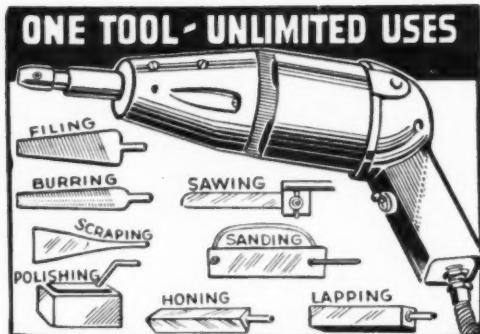
### Lead screw multiple head tapping

It is claimed that the multiple tapping of two or more small holes can be done with lead screw protection economically on any drill press with Etteco-Emrick self-contained lead screw multiple tapping units. These are made by Etteco Tool Co., Inc., Dept. BB, 594 Johnson Ave., Brooklyn 37, N.Y. This is possible even though the tap sizes, pitches, or both, are not the same. The unit, consisting of a reversing head, a three spindle multiple head and a fixture, taps two 0-80 holes in aluminum. The lead screw, having a fast pitch, runs slower than the taps and is completely enclosed during operation.



# STOP... HAND WORK

Use these Handy PORTABLE ELECTRIC RECIPROCATING TOOLS for Greater Production, Better, More Uniform Work — All with less Operator Fatigue. Fixed strokes are  $\frac{1}{8}$ " or  $\frac{3}{8}$ " long. Operate on 110 volts AC-DC. Deliver 1000 PUSH-PULL strokes per minute.



Try one of these tools on your next job.

**ACME TOOL COMPANY**

71 WEST BROADWAY

NEW YORK 7, N. Y.

**Why break your back. . . SAVE TIME, LABOR, MONEY with**

Medelton  
Motor  
Driven

**"Powerroll"**

**\$270.00**  
F. O. B. N. Y.  
800 LBS. CAP.

## FEATURES . . .

- Eliminates hazards of lifting heavy rolls.
- Roll on your coil and it's ready to go.
- Slack loop prevents drag on feed or dies.
- 30% to 40% higher daily production on hand or automatic feeds.
- Re-loading time kept to a minimum.
- No pulling of coils, avoids operator's fatigue, and results in faster feeding.

Write for circular. Dealer inquiries invited

**WM. HALPERN & CO., INC.**  
Machine Tools

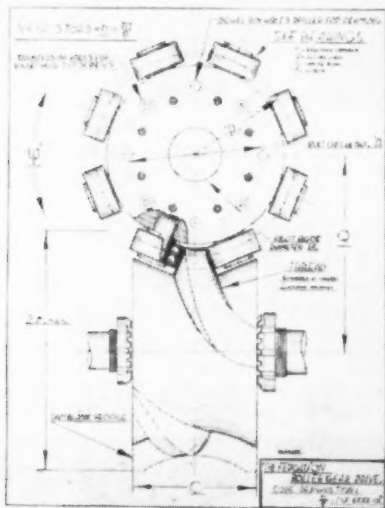
53 PARK PLACE 245 CONNECTICUT AVE.  
NEW YORK 2, N. Y. BRIDGEPORT, CONN.

**\$357.00**  
F.O.B. N.Y.  
2000 LBS. CAP.



## Ferguson roller gear drive now standardized

Standardization has become the keynote at the Ferguson Machine & Tool Co., Dept. BB, P.O. Box 191, St. Louis 21, Mo. The Ferguson roller gear drive, a new type of intermittent motion or indexing mechanism replaces Geneva drives, ratchet and crank mechanisms, etc., it is claimed, resulting in increased



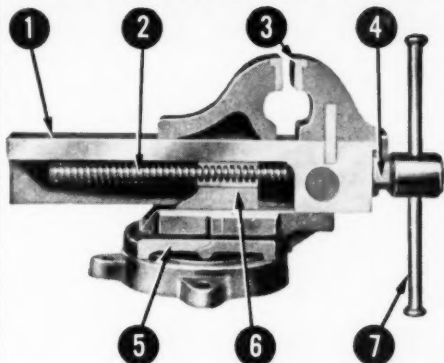
operating speeds, lower maintenance costs and self locking precision of index.

Standardized drives are available with 6, 8, 10 and 12 stops per revolution of the output shaft and with indexing times of either 1/4, 1/3, 1/2 or 3/4 of the total cycle time.

## Wear Strips by Ohio Knife

The Ohio Knife Co., Dept. 4, Dreman Ave., Cincinnati 23, Ohio, is offering OK wear strips in welded Ampco bronze. A special method of bimetal welding is used, thus reducing the amount of bronze needed. Longer wear is said to be achieved as the wearing surface is aluminum bronze. The bronze is welded to a soft steel base, readily machinable for required drilling, tapping and machining to required thickness. Surfaces are ground to close

## ALL THESE EXTRAS



1. All steel slide gives greater capacity; guaranteed not to fail.
2. Steel screw, fully enclosed and protected.
3. Stands heaviest blows: jaw inserts fit on shoulder. Screw takes no shock.
4. Easier lubrication due to outside retainer.
5. Full 360° swivel, positive-locking base.
6. Minimum backlash; longer, stronger vise nut lasts indefinitely.
7. One piece handle, non-pinching type.

## AT NO EXTRA COST

Ask for Desmond-Simplex vises—by name—and you'll get the best vise value, yet pay no more than for ordinary vises. Desmond-Simplex STEEL-SLIDE enables us to give an unconditional guarantee against defects in workmanship or materials for the life of the vise. Complete line for every requirement available through leading jobbers . . . THE DESMOND-STEPHAN MFG. CO., Urbana, Ohio.

**DESMOND  
SIMPLEX VISES**

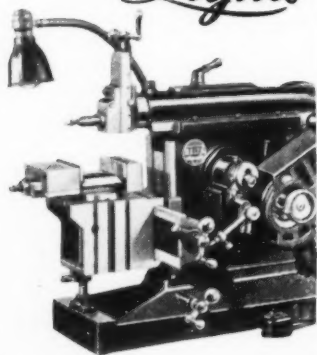


## SHAPER OPERATORS

SEE BETTER  
WORK BETTER

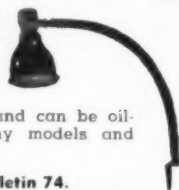
WITH HELP FROM

**VIMCO**  
*Lights*



Vimco lights give on-the-spot lighting that no general plant lighting can possibly provide for close machining operations. Inaccuracies . . . injuries . . . slowdowns . . . are prevented in many instances when you eliminate the major source of worker fatigue—eye-strain.

Vimco lights can be easily installed. Their movable arm stays put and can be oil-proofed if desired. Many models and designs available.



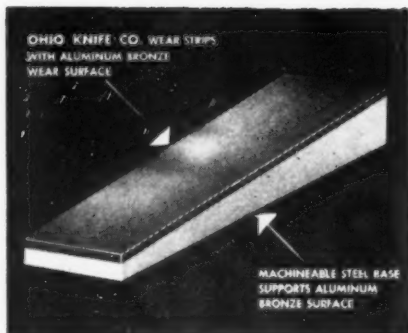
Write for bulletin 74.

**VIMCO MFG. CO., Inc.**

SINCE 1919

109 Brayton Street

Buffalo 13, N.Y.

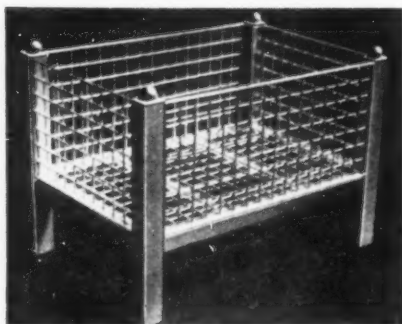


tolerance, thus reducing manufacturing and assembly time. A large assortment of sizes available or made to special order.

### Wire stacking box

A new stacking type material handling box is announced by Equipment Mfg., Inc., Dept. BB, 21550 Hoover Road, Detroit 5, Mich.

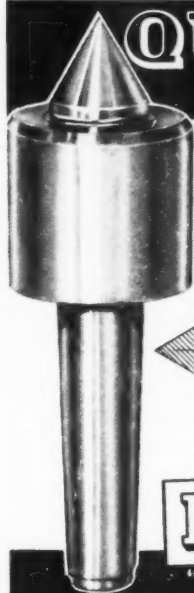
The box, instead of using corrugated sheet metal has sides and bottom of wire fabric to decrease weight and allow for ventilation and drainage. The



wire is welded at ends and each intersection for strength and rugged shop use. Bottom frame and corner uprights are square welded steel tube.

Stacking caps of the self-centering type on the corner posts permit rapid and safe lift truck tiering to conserve floor space.

The standard model has a content of approximately 30 cubic feet and a weight capacity of 4,000 pounds.

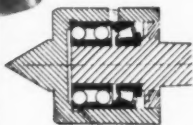


# QUADRO LIVE CENTERS ARE BUILT TO TAKE IT!

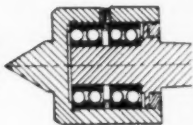
• ACCURATE • CONVENIENT • DURABLE

First choice of factory supervisors is QUADRO—the PRECISION LIVE CENTER designed to support the HEAVIEST load at HIGHEST speed for the LONGEST time!

Each QUADRO CENTER eliminates friction. Two double row precision pre-loaded ball bearings absorb combined radial end thrust. On a lathe, miller or any machine tool, it will give you closer tolerance, dependable performance. That's a guarantee!



TIMKEN BEARING  
LIVE CENTER



BALL BEARING  
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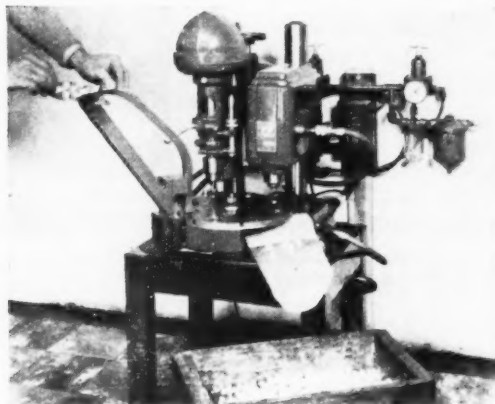
TODAY—ask your supply dealer for FAST FACTS or write to:

## DAKON

TOOL & MACHINE CO., INC.  
496 Broadway, Brooklyn 11, N. Y.

"TWO DECADES OF IMPORTANT TOOL PARTS PRODUCTION"

## CHAMFERING AND MARKING



**6,000 Nuts Per Hour!**

A standard Autamark Marking Machine combined with a Drill Press and Autamark Dial Feed Fixture enabled this manufacturer to chamfer and mark 6,000 nuts per hour . . . all automatically.

For a variety of branding, staking, assembling, and marking operations investigate the Autamark Marking Machine—it is versatile and fast, marking up to 15,000 parts per hour.

From the smallest to the largest requirements, we are equipped to deliver promptly, quality marking equipment. Let us quote on your marking needs.

*Imperial* STAMP & ENGRAVING CO., INC.

4456 N. WESTERN AVE. *Chicago* 25, ILL. • CORNELIA 7-5882



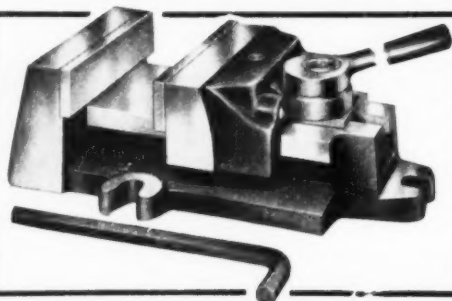
## WALTHAM CYLINDRICAL SUB-PRESSES

Dies for high precision work should not only be perfectly aligned but provision should be made to maintain that alignment throughout the life of the die. Our bulletin shows how it can be done.



ARCH SUB-PRESS

**WALTHAM MACHINE WORKS** WALTHAM 54, MASS.



**Plunket Quick Action Vise**  
for **DRILL PRESS** or **MILLING MACHINE**  
Designed for production work, using an eccentric motion to apply pressure to jaws. Eccentric motion moves jaws 5/16".  
Size Net Price

6" jaws, 1 1/2" deep, opens 4".....\$69.30  
Pressure between jaws, with handle furnished, 2200 lbs. Net weight 36 lbs.  
Our complete line includes Vises for Drill Presses, Milling Machines, Shapers, Grinders

**WRITE FOR CATALOG**

**J. E. Plunket Machine Co.** 1823 W. Lake St.  
Chicago 12, Ill.



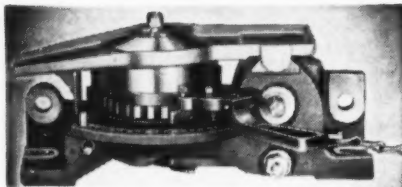
## IMPROVE FACING OPERATIONS

M-D Facing Head feeds automatically. Lathe tool bit travels radially, from center outward or reverse. 10 sizes 6" to 46" dia. Write for Bulletin, Prices.

On Boring  
Mills  
Drills  
Lathes  
Millers and  
Radials

**MUMMERT-DIXON CO., 122 Philadelphia St., Hanover, Pa.**

## MODEL H . . . AUTOMATIC CHUCKING and INDEXING FIXTURE



1. 1800 light cuts per hour.
2. Either horizontal or vertical position.
3. Collets changed instantly.
4. Automatically knocks piece out.
5. Ratchet or degree indexing—degree indexing added later if desired. Capacity 1".
6. Automatic indexer also added later. Model F—Both degree & ratchet indexing. Capacity up to 2 1/4".

*Write for Folders.*

**J. W. DEARBORN, Ansonia, Conn.**





### POWER REAMING MACHINE

Will save many times its cost! Ideal for removing burrs after keyseating or tapping of set screw holes. Finish reaming speeded up with increased accuracy. Tedious hand reaming eliminated.

### CATSKILL ABRASIVE CUT-OFF TOOL

A rugged, compact unit for constant production. Cuts accurately a wide range of materials—readily adjustable to cutting of all non-ferrous metals and plastic. Safety and accuracy assured.

**JOSEPH E. MURPHY CO.**

24 Ellsworth St. Worcester 3, Mass.



## KAUFMAN TAPPING MACHINES



Kaufman specializes in tapping machines—every machine precision-built to meet the requirements of individual production jobs. Designed with fully automatic cycle, single or multiple spindle heads and other most advanced features.

Write for complete information

**KAUFMAN MFG. CO.**

MANITOWOC

WISCONSIN

## CLEAR

### NAMEPLATE MARKING

MODEL  
No. 4



The nameplate on your product is your signature; keeps it neat and legible! Accurate location and alignment are assured

with this  
**NAMEPLATE  
DETAIL PRESS**

- Simple Operation
- Perfect Alignment
- Uniform Depth

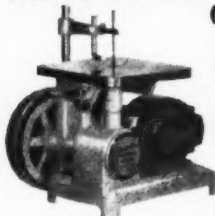
**GEO. T. SCHMIDT, INC.**



1804 W. BELLE PLAINE AVE.  
CHICAGO - 13 - ILLINOIS

## MILWAUKEE DIE FILERS PROFILE GRINDERS

Give you more value for your money!



- The MILWAUKEE DIE FILER for straight-line, sharp-corner filing, sawing and lapping.
- The MILWAUKEE PROFILE GRINDER for high speed, precision grinding of curved and irregular contours.

Write for Complete Details

**RICE PUMP & MACHINE CO.**  
224 N. 12th Ave. Grafton, Wisc.



## WHITNEY LEVER PUNCHES



**No. 4-B  
IN  
METAL  
BOX**

This member of the line of Whitney Hand Lever Punches has a capacity of  $\frac{1}{4}$ " hole thru 16 gauge iron. Packed in a heavy steel box with rack to hold 7 punches and dies. Built for hard service. Guaranteed to give satisfaction and to stand up when used within rated capacity. Supplied also in pasteboard carton with 3 punches and 3 dies.

Write for Lever Punch Catalog.

**W. A. WHITNEY MFG. CO.**  
649 RACE STREET ROCKFORD, ILL.

## HOWALD CARBIDE MILLING CUTTERS



PATENTED  
END MILL

- SQUARE BLADES Easily Replaced.
- Simple, Accurate Blade Adjustment.
- Lowest Blade Cost.
- Cutters from  $1\frac{1}{2}$ " to 14" dia.

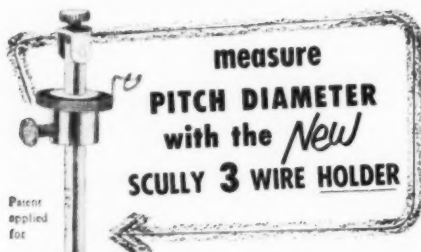


PAT.  
SHELL  
MILL

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**W. T. HOWALD**  
MACHINE WORKS

182 SIGOURNEY ST., BROOKLYN 31, N. Y.



Patent  
applied  
for

measure  
**PITCH DIAMETER**  
with the *New*  
**SCULLY 3 WIRE HOLDER**

### NO LOST TIME FUMBLING WITH LOOSE WIRES

The Scully 3 Wire Holder features a coil spring securing the single thread wire. The spring allows the single thread wire to assume the Helix angle of the thread, and to maintain parallelism with the double wires. It measures up to 3" diameter with standard wires. Each holder has accurately spaced slots for one American Standard pitch only: 32, 28, 27, 24, 20, 18, 16, 14, 13, 12, 11, 10 threads per inch.

ONLY  
**\$5.95**  
DIRECT

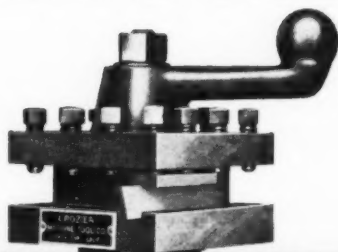


Order direct: Individual holder \$5.95 - with wires for measurements within plus or minus .00015 - \$7.95. Set of 12 holders with Mounting Stand \$40.00 - with wires \$80.00.



**SCULLY MACHINE COMPANY**

62 WALTER STREET BRIDGEPORT 8, CONNECTICUT



America's first and finest  
**CROZIER TOOL POST TURRET**

12 position indexing now makes possible the alignment with work at any thirty degree increment - built-in cut-off tool and holder and positive rapid indexing. They are available in 3 sizes. Save as much as 75% set-up and down time.

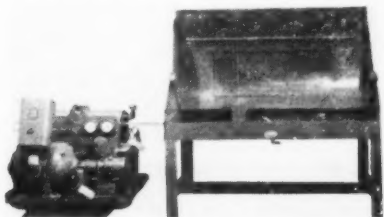
Write for catalog.

**CROZIER MACHINE TOOL CO.**

Hawthorne, California

### Test stand checks recoil cylinders

A test stand for checking recoil cylinders for hydraulic pressures from 3000 p.s.i. to 5000 p.s.i. has been designed and built by the J. N. Fauver Co., Inc., Dept.



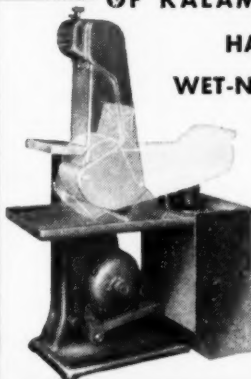
BB, 49 West Hancock, Detroit 1, Mich. The equipment consists of: Fauver hose assemblies; Parker fittings; Parker tubing; Marsh gages; 30 gallon tank. The stand has a telescopic lid and plexiglass window.

### Water and oil soluble metal cutting agent

A Dynamic metal cutting agent, Metalloid WOS, for all machining and grinding operations, soluble in both water and oil, is the newest development of The Metalloid Corp., Dept. BB, Huntington, Ind. The product is an odorless, nontoxic, sulphur-free solubilized organic condensate containing chlorine, nitrogen, oxygen and carbon in a complex molecule. The material is said to be nonstaining for ferrous and nonferrous metals except some copper and brass alloys which will

## Hammond OF KALAMAZOO

### HAMMOND VH-6 WET-N-DRI ABRASIVE BELT GRINDER



Ideal for flat surface grinding and polishing of castings, forgings, plastics, etc. Can be changed from vertical to horizontal operation by loosening one cap screw.

*Hammond Machinery Builders*  
1614 DOUGLAS AVENUE, KALAMAZOO, MICHIGAN

discolor slightly if the product is allowed to remain on the work for a period in excess of 12 hours. It is safe for use on silver and silver alloys.

### Air control valve

Hannifin Corp., Dept. BB, 1130 South Kilbourn Ave., Chicago 24, Ill., announces a new, special air control valve which, the manufacturer asserts, makes practically impossible "repeats" due to valve failure on mechanical presses controlled by air-operated clutches and brakes. The New valve, latest to be



IN 11 SIZES—No. 6 to 1"  
N.C. in all S.A.E. sizes.



*You Need an Extra Hand Now  
to Speed Up Production!*

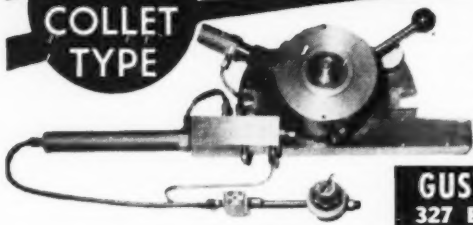
### HEIMANN TRANSFER SCREW SETS

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

**HEIMANN MFG., CO. • URBANA, OHIO**

# G&H INDEXING FIXTURES

## COLLET TYPE



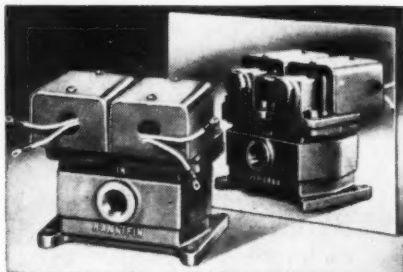
Provide faster finishing of multi-machined precision parts. Quick acting for easy set-up and fast indexing on wide variety of machines. Easily mounted at any angle on millers, grinders, shapers, drill presses, etc. Index plates with 24 notches for any multiple of 15°—one plate can be used to give 2, 3, 4, 6, 8, 12 or 24 index positions per revolution. Special plates furnished for particularly complex jobs.

Write for full information

**GUSTAFSON ENGINEERING CO.**  
327 ELM ST., FITCHBURG, MASS.

announced in the firm's new line of "Pilot-Master" valves, is a dual three-way valve—two three-way valves in parallel in one compact, common body. Both valves must operate to start the press, but if for any reason only one valve reverses, the unit "fails safe" and the press stops.

The new valve is called the P-M Series BB-5 and is offered only in ¾" i.p.s. It is an adaptation of the firm's



## EASY-CUTTING EKSTROM, CARLSON



### SPIRAL-FLUTE ROUTER BITS

- STRAIGHT OR INVERTED-TAPER SHANKS
- SINGLE OR DOUBLE FLUTE
- SINGLE OR DOUBLE END
- UP-CUT OR DOWN-CUT SPIRAL
- AVAILABLE IN ANY SIZE, TYPE, OR QUANTITY

*Write for Literature*

**EKSTROM, CARLSON & CO.**  
1400 Railroad Ave., Dept. M-3  
ROCKFORD, ILLINOIS

MANUFACTURERS OF AIRCRAFT PRODUCTION MACHINERY

## READING BENCH KEYSEATER

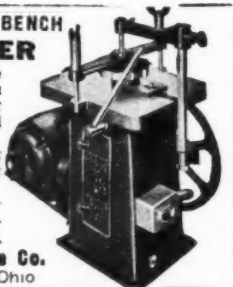
Portable — move directly to job; a time saver for both small and large shops.

3¼" stroke; adaptable for other work.

Low first cost—prompt delivery.

Good dealers wanted.

**Reading Machine Co.**  
Cincinnati 37, Ohio



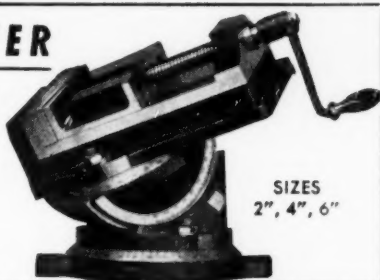
The simplified PYRO Optical is the ideal instrument for direct temperature readings of ANY heated object in your plant. Completely SELF-CONTAINED, PORTABLE, RUGGED, LIGHT WEIGHT (3½ lbs.) and FOOLPROOF. No correction charts no accessories and no maintenance expenses. Unique design permits temperature determination even on MINUTE SPOTS. Fast MOVING OBJECTS and of the SMALLEST STREAMS. Write for Catalog No. 80

**THE PYROMETER INSTRUMENT CO.**  
New Plant and Laboratory, Bergenfield 3, N. J.

## MAKE SET-UPS FASTER

Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop. 3 swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional. Write for circular.

**DONOVAN MFG. CO.**  
80 BATTERYMARCH ST. BOSTON, MASS.



SIZES  
2", 4", 6"

earlier Series B-3 valve, announced last year for this same service, and like the B-3 it is capable of speeds in excess of 600 cycles per minute.

The two solenoids in this dual valve are connected in parallel in the electric circuit of the press. The two pilot sections are interlocked pneumatically so that, if either solenoid fails to operate, the valve will not build up enough pilot pressure to operate either main valve and the press will not start. On the other hand, with the press moving, if either solenoid or either pilot valve reverses, pilot pressure will fall so low on both sides that both main valves will reverse and the press will stop.

The two solenoids, like all the "Pilot-Master" solenoids, are short stroke, low amperage, continuously rated, with transformer type silicon iron plungers and frames. Hardened tool steel is welded across the entire plunger face so that the laminations cannot spread and cause the plunger to jam. The solenoids can be completely disassembled, and coils for 115, 230, or 460

volts and for either 25 or 50/60 cycles are all available as standard.

### Morton vertical boring and finishing machine

This machine is designed for performing both the rough boring operation before babbiting and the finish boring operation after babbiting of A.A.R. car journal brasses. It is made by Morton Mfg. Co., Dept. BB, Muskegon Heights, Mich.

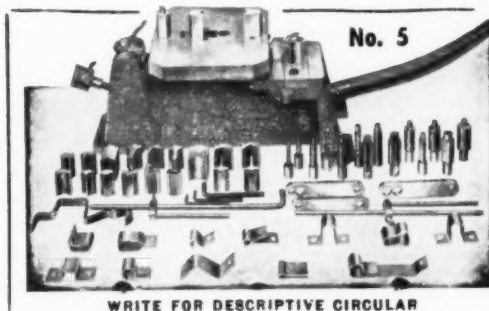
The saddle is fitted with bearing

## DIAMOND WHEELS

HAND  
HONES & LAPS

Fast Delivery

**BLACKFORD Manufacturing Co.**  
Hartford City — Indiana



WRITE FOR DESCRIPTIVE CIRCULAR

**Multiform** BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to  $\frac{3}{4}$ " x  $1\frac{1}{2}$ " as illustrated, other models up to  $\frac{1}{4}$ " x 4".

**J. A. RICHARDS CO.**  
KALAMAZOO, MICH.

**SOLD THRU LEADING SUPPLY HOUSES**



**GROBET CHATTERLESS COUNTERSINKS**

Six staggered cutting edges give shearing cut that eliminates all chatter.

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**GROBET FILE CO. OF AMERICA, INC.**  
421 Canal Street New York 13, N. Y.

**NIELSEN**  
**Heavy Duty**  
*Live Centers*

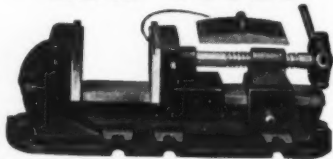
Write for  
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live centers

Adapted  
for heavy  
duty work.  
Precision type  
ball and roller  
bearings assure  
maximum capacity  
for high speed  
production and long  
service.



**NIELSEN, INC.** LAWTON, MICH.

**GEM VISES**



Made in a range of sizes and types, to handle most any kind of machining operation, where vises are applicable. Write for circular, etc.

**J. E. Martin Mach. Works, Springfield, O.**

**NEW SATIN CHROME**  
PRECISION  
**HEIGHT GAGE**

**12" to 36"**

- LONG VERNIER SCALE
- HEAVY BASE & BEAM
- SATIN CHROME FINISH
- HIGHEST PRECISION

ALSO VERNIER CALIPERS, ETC.

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**BRAND TOOL CO.**

907 S. VICTORY BLVD.  
BURBANK, CALIF.



**INSTANT ACTION RAPIDSET**  
by **HARTMANN**

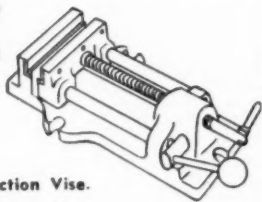
All Purpose Tool Room and  
Machine Shop Vises.

*The*  
**JAWSET**

Adjustable Pressure Production Vise.

For Information Write Dept. M

**Hartmann Mfg. Co., 1637 Goult St., Racine, Wisconsin**

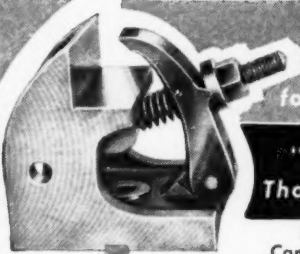




**SAVE Time and Money**  
on Set-ups, without special  
expensive jigs and fixtures

## **HART MILLING FIXTURES**

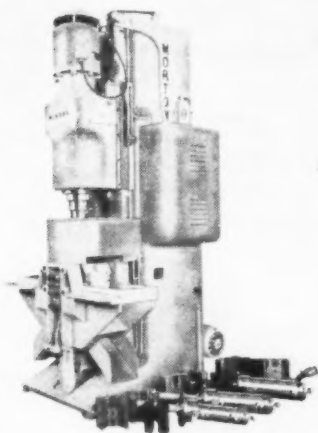
**WALTER W. FIELD & SON, INC.**



Write for  
illustrated,  
folder about the

**"Masters of A  
Thousand Set-ups"**

39 Hayward St.,  
Cambridge 42, Mass.

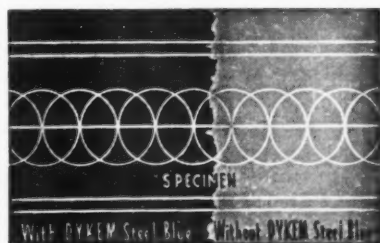


plates and gibs to provide for accurate  
guiding on the hardened ways of the  
column. It is bored to receive a special  
heavy duty boring spindle which oper-

ates in antifriction bearings. A 15 h.p.  
a.c., 900 r.p.m. vertical motor drives  
the spindle through the gear box.  
Sliding reduction gears are provided  
for adjusting the spindle speeds for  
rough boring and finishing operations.  
Power for operation of clamping and  
for feeding the cutters is from a self  
contained hydraulic circuit driven with  
5 h.p., a.c. motor and control equip-  
ment.

The spindle is made of a steel forging  
accurately machined and ground and  
provided with antifriction bearings  
mounted in the saddle to form a rigid  
support in the saddle for the extended  
boring bar. The spindle has a large  
flanged end which is provided with a  
pilot so that the various diameters of  
cutting heads may be quickly applied  
and secured to it.

The bearing carrier members rotate  
from the horizontal loading position to  
the vertical boring position by means  
of a hydraulic cylinder. The clamping  
pressure is applied against the back of  
the brass to hold its milled toe surface



## **DYKEM STEEL BLUE**

**Stops Losses in Making Dies and Templates**

Simply brush on, right at the bench; ready for the lay-  
out in a few minutes. The dark blue background makes  
the scribed lines show up in sharp relief, and at the  
same time prevents metal glare. Increases efficiency  
and accuracy.

Write for full information.

**THE DYKEM COMPANY**

2301G North 11th St.

St. Louis 6, Mo.



# SUPEREAM

## REAMERS IN Decimal SIZES

From .032 .033 .034 .035 all the way up-blanks can be ground to your exacting specifications, delivered in approximately 10 days. By purchasing SUPEREAM REAMERS in steps of .001 you save Time, Labor and Money in the cost of extra machining and lapping. SUPEREAM REAMERS all have ground and polished flutes and are held within .0002 tolerance.

REAMERS are also furnished in Right-hand spiral, right hand cut, as well as Left-hand Spiral, Right-hand cut.

IN EMERGENCY PHONE  
LIBERTYVILLE 2-4200



Write for descriptive literature and prices.

**TWENTIETH CENTURY  
MANUFACTURING CO.**

Box 429-B

Libertyville, Illinois



### waiting for you

Gone are the days when you had to wait for delivery on most punches and dies while they were made to order. Now they wait for you.

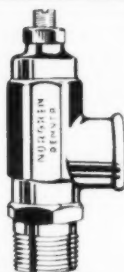
You can order for immediate shipment from our stock 76 styles of punches and 65 styles of dies in round, flat, oval, and square sizes to fit most makes of presses.

Besides this saving of time, you save money. Send for our catalog sheets and check the lists of immediately available sizes and their prices.

**T. H. LEWTHWAITE MACHINE CO.**  
312 East 47th St. New York 17, N. Y.

### relief valves

for  
**AIR-  
WATER-  
OIL-  
GASES-**



1/8"  
to  
1"

**automatic  
holds setting  
positive relief**

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C. A. CO. 

3438 So. Elati St., Englewood

In Colorful Colorado

Valves • Filters • Regulators  
Lubricators • Hose Assemblies



OPEN

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TRADE  MARK



CLOSED

Offset Type

## CONTINUOUS HINGES

All hinges shown can be furnished with special holes, cutouts and bends to blue-print in metals to suit the job.

THREE-FOURTHS  
OFFSET



**AUTO MOULDING  
& MFG. CO.**  
**1110 E. 87TH ST.**  
**CHICAGO 19, ILL.**

SPECIFICATIONS:  
Open width 7/8" to 6"  
Gage Material .040 to .123  
Pin Diameter .101 to 3/8"  
Lengths to 120"

SEMI-OFFSET



## GENEVA DRIVES NOW OFFERED AS STOCK ITEM

If you use Stock Gears, Bearings, Bushings, Pulleys, Etc.,  
You Need Our Circular On **GENEVA DRIVES.**

WE ARE NOW ASSIGNING EXCLUSIVE TERRITORIES TO REGISTERED SALES  
ENGINEERS ONLY—WRITE TODAY.

**GENEVA MACHINE & TOOL CORP.** 402 ELLAMAE ST., TAMPA 2, FLORIDA



### SELLEW (Standard DRILL HEADS)

will greatly increase your drilling output

*In stock for immediate delivery.*

No. 0AD min. .65" max. 3.4" — $\frac{1}{8}$ " drill  
No. 0D min. .9" max. 4.6" — $\frac{1}{4}$ " drill  
No. 1D min. 1.16" max. 6.33" —No. 1 M.T.  
No. 3D min. 2.5" max. 13" —No. 3 M.T.  
Heads with fixed spindles designed and built  
to customer specifications.

*Send Us Your Drilling Requirements*

**SELLEW MACHINE TOOL CO.** Inc. 1910  
PAWTUCKET, R.I.



against parallel spacers, interchangeable  
for various sizes of bearings.

### Combination cable connector

The Shortstub electrode holder manufactured by Bernard Welding Equipment Co., Dept. BB, 10222 Ave. N, Chicago 17, Ill., is said to be a new design combination welding cable connector.

Previously, the welding cable could be attached to the holder by soldering only. The new combination connector now provides for attaching to the welding cable or by soldering as in the

past, or by a combination of these two methods.

A large contact area between the holder and the cable and an extremely tight connection is made possible by the use of a large  $\frac{1}{2}$ " diameter fine thread socket screw. Another equally important feature is that a hole is provided in the fiber handle for the insertion of a hex key wrench so that the tightness of the connection can be maintained in just a few seconds without disassembling the holder.

## REDUCE DRILL BREAKAGE

... with full length bearing precision bushings, O.D. ground true to I.D. • We specialize in hole sizes #80 to  $\frac{3}{4}$ ", in any body size. Other sizes to your specifications. Production small hole drilling, our specialty.

*Write for catalog and quotations.*

**MICRO DRILL GUIDE**  
AND ENGINEERING COMPANY • Detroit 35, Mich.  
P.O. Box 5184, Southfield Sta.

## California firm first with new metal fastening tools

Rotex Punch Co., Inc., Dept. BB, San Leandro, Calif., announce that they are the first firm licensed to make tools for Williams Metalacing, the new method of literally buttoning sheet metal together.

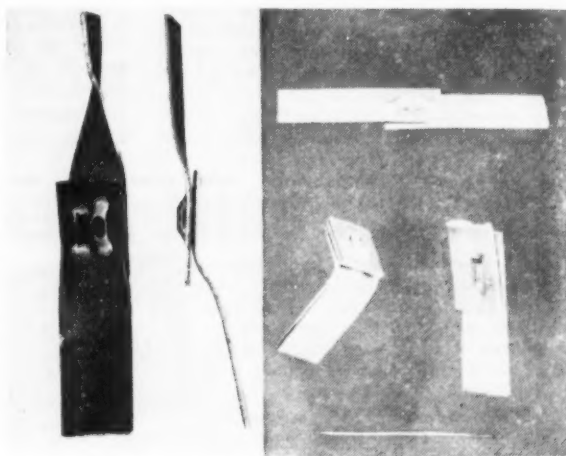
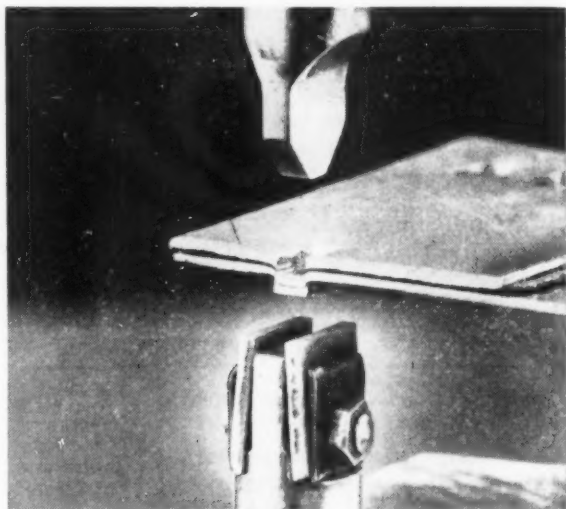
Announcement of the agreement was

made jointly by Rotex and Crockatt Eng. Co., whose headquarters are in San Francisco's Phelan Building. Crockatt has sole rights to license the new method under patents granted its inventor, Ivan A. Williams of Portland, Ore.

Metalace punches and dies can fasten metal up to  $\frac{1}{4}$ " thick and may be used to convert any ordinary punch press

Cross section view of "Williams Metalace," new one step method of fastening metal to metal, shows patented punch and die and the manner in which the fastening is created without any additional material. Descending action of the punch creates a parallel double incision in the sheets being fastened. Metal between these incisions is pushed downward, against the anvil of the die beneath the sheets and between the die's yieldable jaws. There the force of the impact spreads the depressed metal laterally, making it form a permanent fastening wedge or button under the surface of the bottom sheet. Material shown in this photo, highly magnified for illustrative purposes, is sheet stainless steel, only  $\frac{1}{32}$ " thick.

**Strength of Metalace** fastening compares favorably to conventional rivets, as the photo above indicates. Despite severe twisting and bending, Metalace fastenings on steel at left held firm. At right is aluminum, fastened by a single Metalace. Here the basic parent metal broke under stress, but not Metalace fastening.



## PERFEX HOLDS 22" GAGE TO *TENTHS*



Of course, only one shop in a thousand needs these giant gages—but only one in a thousand has the experience and equipment for handling such precision. That's why Perfex is a better source for *all* your gage needs in thread rings and thread plugs, as well as specials. We still make 24 to 48 hour shipments on most standard thread plugs, from 0-80 NF to 1½"—6 NC, class 2 and 3. Our facilities include the finest grinding and checking equipment, operated under controlled temperature conditions, by a constantly growing force of the country's highest-skilled gage-makers. We're proud to offer you a superior product and service to match. Please write for copy of our new catalog and name of the Perfex representative near you.

*Perfex also manufactures Tangi-Matic, the angle-tangent-to-radius dresser that eliminates height gages and "mikes"*



# PERFEX GAGE & TOOL CO.

Dept. AM, 122 Avery St. • Mt. Clemens, Mich.

to metal fastening duty, it is claimed.

Metalacing, according to its backers, works with any metal which can be sheared, drawn and upset. It is said to be ideal for light metals. Also, it readily fastens dissimilar metals together, such as steel and aluminum. Strength and holding qualities of the Metalace fastening compare favorably with conventional rivets, it is stated.

Success of the Metalacing stems from three separate operations that take place

during the impact of the punch on the metals being fastened and on the patented yieldable die. First, shearing action of the punch and die creates a parallel double incision in the two sheets of metal being fastened. Metal between these incisions is rammed downward, against the anvil of the die beneath the sheets and between that die's movable jaws. There the force of the impact spreads the depressed metal sideways, making it form a permanent fastening

wedge or button under the surface of the bottom sheet.

Because the Metalace fastening actually is formed of the parent metal, it may be easily sawed or reworked. Additionally, since individual Metalace fastenings are rectangular in outline, they will not pivot, as rivets or bolts do. For these and other reasons, backers of the method expect it to find immediate and widespread use by fabricators of sheet metal in any form, from sheet metal shops on up to truck, train and airplane body plants.

### **Simonds Si-Clone round centerhole saws available bushed $\frac{5}{8}$ " - $\frac{1}{2}$ "**

Simonds popular priced Si-Clone saws with round centerholes are now available bushed  $\frac{5}{8}$ "- $\frac{1}{2}$ " in 6", 7", 8" and 9" diameters, according to an announcement by Simonds Saw & Steel Co., Dept. BB, Fitchburg, Mass.

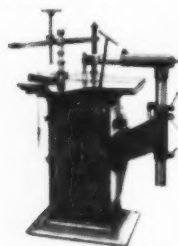
Saw types now furnished bushed include rip, cutoff, No. 52, 54, and 60 combination, easy-cut and planer. Each



package is clearly marked to show that the saw is bushed and a small card in the center of the saw gives directions on removing the bushing where a  $\frac{5}{8}$ " centerhole is desired.

With bushed saws a retailer can offer a much larger selection of saw sizes and types, thus giving users a choice of more saws with either  $\frac{5}{8}$ " or  $\frac{1}{2}$ " centerholes for use on their table, bench, and radial arm and some portable hand saw machines.

These same saws are also available unbushed with  $\frac{1}{2}$ " and  $\frac{5}{8}$ " centerholes.



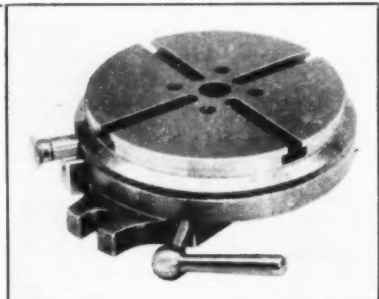
**S** TRAIT OR  
TAPER KEYWAYS  
**U** NIVERSAL  
CENTERING  
**N** O BUSHINGS OR  
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REQUIRED  
**R** UGGED STEEL  
CONSTRUCTION  
**A** TABLE TYPE FEED  
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MACHINE

Faster and more economical cutting of keyways with SUNRAY. Meets your most exacting requirements. Keyways cut  $\frac{1}{4}$ " to 1" by broach having several teeth cutting at once; also eliminates tendency of cutter to dig into the work. Many other advantages!

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can be used for: Engraving, Profiling, Graduating, Milling or Drilling . . . by the makers of PREIS-PANTO ENGRAVING MACHINES, ETCHERS, MARKERS, GRINDERS, CUTTERS, MASTER COPY TYPE AND ENGRAVING ACCESSORIES.



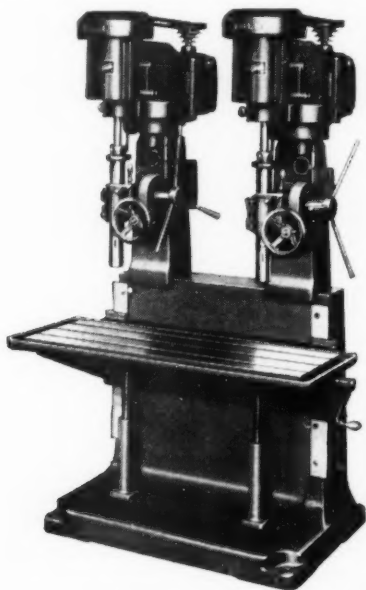
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**H. P. Preis Engraving Machine Co.**  
647 State Highway 29 Hillside, N. J.

### Sibley two-spindle is improved

An improved design for its two-spindle, 20" swing, Model MC-20 drilling machine has just been announced by Sibley Machine & Foundry Corp., Dept. BB, 206 E. Tutt St., South Bend 23, Ind.

A much sturdier column and heavier "beefed-up" base have been incorporated in the new design to provide the



rigidity and stamina required for this machine's capacity of  $1\frac{1}{4}$ " drilling in mild steel. This, coupled with the MC-20's sensitivity for small size drills, recommends it for a variety of production drilling jobs.

A dial indicator for easy selection of geared power feeds steps up operator efficiency; a spring-loaded lever for changing the 8-spindle speeds, of 65 to 1360 r.p.m., cuts operator time.

Most women would be cured of jealousy if they would only take one good, steady and impartial look at their husbands.

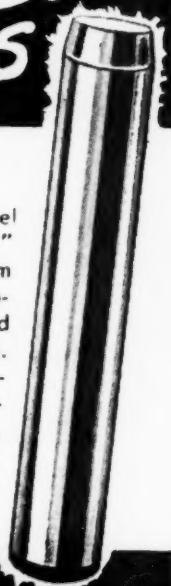


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**Immediate  
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Standard Size Dowel Pins from  $\frac{1}{8}$ " to 1" diameter and from  $\frac{3}{8}$ " to 6" length supplied in .0002 and .001 over basic sizes. Unless otherwise specified, .0002 over-size will be furnished.

Dealer's  
Inquiries  
Invited.

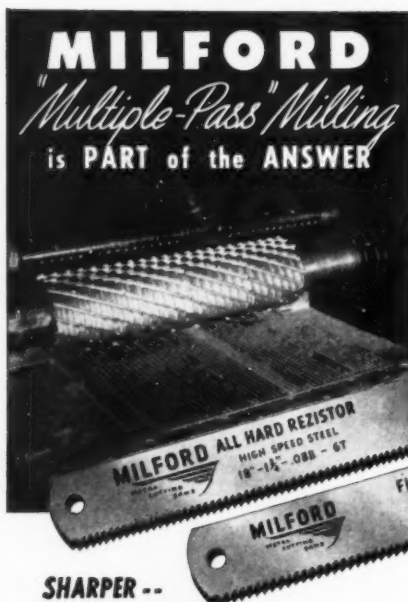


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111 EDISON PLACE  
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**METAL CUTTING COSTS**



**SHARPER --**  
**MORE UNIFORM --**  
**CLEANER TEETH --**

Milled by multiple passes of the cutters, keener, more uniform teeth are produced, absolutely necessary for faster, smoother cutting of metals. The final burnishing pass produces the smoothly finished teeth, which assure fast, effective chip removal.

ALL MILFORD POWER HACK SAW BLADES . . . give you faster cutting with teeth that are sharp, and stay sharp longer.

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SAW BLADE SPECIALISTS  
FOR OVER 75 YEARS  
NEW HAVEN 5, CONNECTICUT  
PROFILE BLADES AND BAND SAW BLADES  
HAND AND POWER HACK SAW BLADES



Sold through MILFORD Distributors who render a service tailored to your needs. The industrial distributor is familiar with the requirements of industrial users in his area. His is a prompt personalized service, as near as your telephone.

**Air impact press**

Cadillac Stamp Co., Dept. BB, 17315 Ryan Road, Detroit 12, Mich., has completed development of the Cadillac "52" air impact press. In the high speed marking field, it is claimed that it gives more speed, power, and pressure. Its speed offers up to 10,000 strokes



per hour. Pressure is obtainable up to 8 tons from 100 lb. airline, and is adjustable from light to heavy marking. It also can be regulated to give proper ram action required for branding or color leaf marking. Its other uses are for assembling, staking, crimping, riveting, and also for producing light stampings. It can be actuated by hand, foot or electrical controls.

**Comparator has 110,000 to 1 magnification**

The universal electrolimit circuit and gage block comparator stand combined with the recently developed P&W electronic recorder have been developed





by Pratt & Whitney, Division Niles-Bement-Pond Co., Dept. BB, West Hartford 1, Conn., to provide an instrument with 110,000 to one magnification.

The 11" scale of the recorder is equal to only .0001, with each primary division equal to five millionths of an inch (.000005), and secondary divisions equal to one millionth (.000001).

#### Four gaging ranges provided in comparator gage

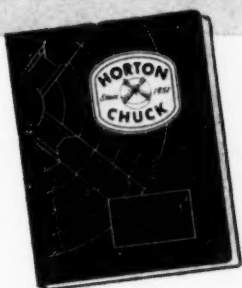
The DoAll Co., Dept. BB, Des Plaines, Ill., announces a new line of electrical comparator gages designed for greater gaging utility. Each of the new models provides four gaging ranges.

By flicking a switch any one of the four ranges is selected so that parts can be checked with the range best



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suited to their tolerance. For example, one comparator model, No. 10, affords full scale ranges of plus or minus .000020", .000040", .000200" and .000400". In the .000020" range each meter division has a value of .000001" and parts can readily be checked to a millionth. On the .000400" range each meter division has a value of .000020" so that parts can be rapidly checked to within .000020" when closer readings are not required. Two other ranges are available between the limits of the above two.

The new comparators utilize the electro-magnetic principle of magnifying the movement of the spindle tip. Vacuum tubes or mechanical linkages are not employed.

### Controls carbide tool wear and breakage

A new device for controlling wear and limiting breakage of carbide tools has been put on the market by the Detroit Milling Cutter Co., Dept. BB, 28625 Grand River, Farmington, Mich., manufacturers of "Futurmill" indexable



blade solid carbide milling cutters and "Futurblade" lathe tools.

Termed the "Loadmeter" this instrument works on the ammeter principle to reflect motor capacity and percent-

## How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes. The Sturdy Square Holed-Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

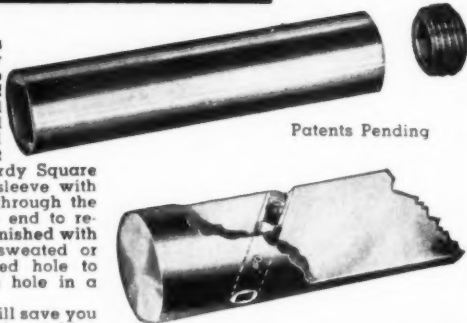
#### SLEEVES MADE IN THE FOLLOWING SIZES:

3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

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DETROIT 19, MICH.



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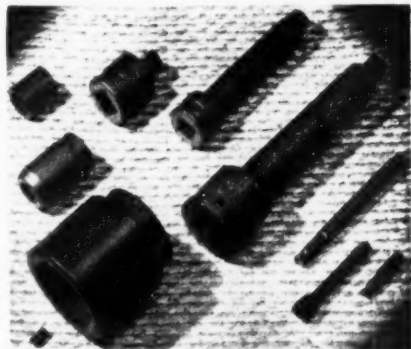
age overloads, but is said to incorporate features not available in an ordinary ammeter.

The unit is constructed with an auxiliary red pointer which can be set by the operator or by supervision at the point at which a tool is dull and should be changed. Industry has pretty well established that a dull tool pulls from 50% to 100% more power than a sharp one. The Loadmeter reduces this generality to pinpoint exactness for a particular tool on a specific job. The overload recorded when the tool is dull is first determined by visual inspection of the tool. The red hand is then set at this point on the Loadmeter with instructions to change tools when the Loadmeter's black pointer reaches the red one.

#### Power impact tools

The Cornwell Quality Tools Co., Dept. BB, 1028 Cleveland Ave., Mogadore, Ohio, has announced the availability of a complete line of power impact sockets, extensions, adapters and drivers for use with Ingersoll Rand, Chicago

Pneumatic, Thor, or any other standard air or electrically powered tool. Sockets are available in square or hexagonal openings for nut sizes ranging from 3/16" to 3 1/2" having drive sizes from 1/4" to 1 1/2". In addition, they



can be furnished in both standard and deep lengths. Extensions are available from 1/4" to 1 1/2" drive sizes in a wide range of standard lengths. Adapters

**for greater RIGIDITY  
more ACCURATE cuts**



**use  
CRITERION**



**BORING  
HEADS**

A full line of adjustable boring heads and bars now available. Heads 1 1/2" to 7" dia. Carbide or high speed bars 3/8" to 1 3/4" dia. Lead screws ground AFTER HARDENING. Ample bearing surface, heat treated parts, interchangeable shanks. Criterion tools are the criterion. Write for free catalog and costs.

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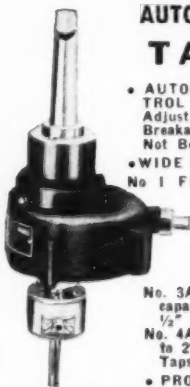
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fies them by the jobs they do...  
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—capacity No. 2-  
56 to 3/8" in Steel  
1/2" in Aluminum.  
No. 2B POSITIVE  
TAPPER—capacity  
3/8" to 7/8" in Steel

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capacity 1/2" to 1 1/4" in Steel.  
1/2" to 3/4" Pipe Taps.

No. 4A TAPPER—Capacity 3/4"  
to 2" in Steel including Pipe  
Taps.

• **PRODUCTION THREADERS**  
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STANDARD UNIVERSAL ADJUSTABLE AND SPECIAL FIXED CENTER DRILLHEADS

are obtainable to permit interchanging of sockets with other drive sizes of impact power tools. Special tools can be supplied to meet specific requirements.

These tools are manufactured from solid bars of chrome molybdenum steel, hot broached and heat treated.

### **Automatically controls furnace atmospheres**

Lindberg Eng. Co., Dept. BB, 2450 W. Hubbard St., Chicago 12, Ill., has announced a device to automatically control and record the carbon potential of furnace atmosphere.

The Lindberg Carbotrol is a propor-



tioning instrument which is said to enable the heat treater to set his atmosphere or furnace in equilibrium with any steel.

### **Hydraulic multirange flow control**

For metering or controlling the oil flow in a hydraulic system, needed for a particular job, a new multirange flow control valve has been recently announced by The Denison Eng. Co., Dept. BB, 1160 Dublin Rd., Columbus, Ohio. It is designed for operating pressures up to 3000 p.s.i. and offered in 2 port and 3 port types in  $\frac{1}{4}$ ",  $\frac{3}{8}$ " and  $\frac{1}{2}$ " sizes for subplate mounting, with or without built-in checks.

Being of the pressure compensating type control, oil flow can be maintained at a uniform rate regardless of circuit pressure variation, insuring smoother

## **Stop and Shop** at Rivett's production corner

### **DRAW-IN COLLETS**

Stocked in all standard styles...checked 25 times against master gauges...guaranteed to run "dead true" at collet mouth. Write for Bulletin 100.



### **THREAD TOOL**

No operator skill required to produce perfect threads. Duplicates threads without gauging. Mounts on any screw-cutting lathe. Write for Bulletin 110.



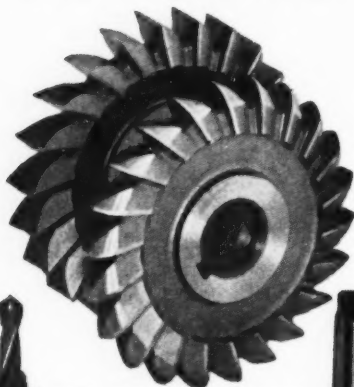
### **LOCKJAW**

Set-ups stay put! Grips both downwards and sideways...eliminates bolting and clamping. Used on all table top machine tools. 2 sizes available. Write for Bulletin 140-A.



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Dept. MT8A5  
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**SAVE TIME - SAVE MONEY  
SAVE TOOLS**  
For rapid changeover of Tool  
setups

## **SPECIAL TOOLS FROM STANDARD TOOLS**

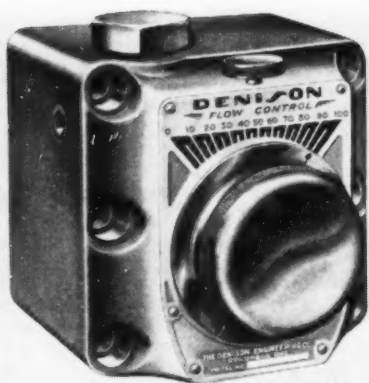
All types of special reamers, cutters, end mills and drills can be made from standard catalog tools. We can make these specials to your blueprints quickly and economically from our large stock of standard cutting tools.

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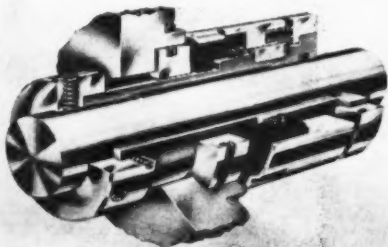
operation and freedom from erratic motion.

Featuring a 2 way adjustable orifice, it provides full regulation of flow within a given range and an optional choice of ranges to accommodate low or high volume systems. In addition to being adjustable in length, the width of the orifice can also be varied by turning the entire control stem upward or downward. A knurled dial adjustment locking screw limits each range of control.

### **Heavy duty type balanced mechanical seal**

A heavy duty mechanical seal which will withstand pressures up to 1,000 p.s.i. is now being offered by the Crane Packing Co., Dept. M-3, 1800 W. Cuyler Ave., Chicago, Ill. Known as the Type 8-B shaft seal, it is said to be applicable where ruggedness to withstand high pressures is an important factor.

A packaged unit, the Type 8-B shaft



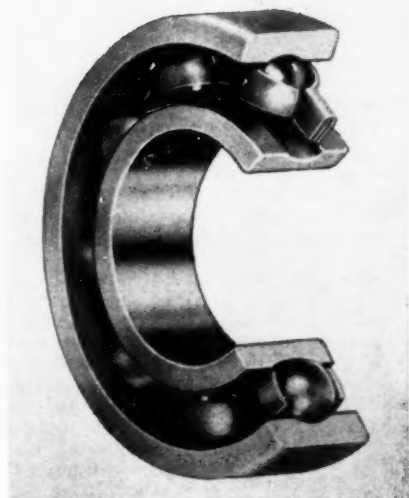


seal is factory inspected and furnished pre-assembled on a sleeve for ready installation. When used with split case pumps it is not necessary to lift the upper half of the casting to install or remove the seal.

Incorporating a rotating sealing washer and a "floating" stationary seat, balance is accomplished by lowering the washer face to a point where stuffing box pressure is not exerted against the sealing area. Mating faces of the washer and seat are precision lapped to .0000232".

### Nice Ball Bearing Co. announces "C" series

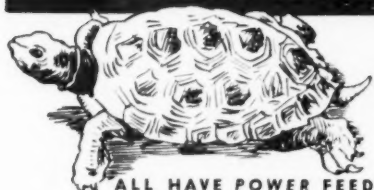
The Nice Ball Bearing Co., Dept. BB, Philadelphia, Pa., announces a new line of precision ground radial bearings. Designated "C" Series, these bearings are of the solid race type with ball retainers and are made in inch dimensions which correspond to established light duty inch standard sizes. They are designed for light duty radial, thrust or combined load applications



and speeds in the neighborhood of 5,000 r.p.m. maximum. "C" Series bearings

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YOU WILL COME TO KNOW THAT  
"A BORING HEAD THAT WON'T FACE  
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ALL HAVE POWER FEED FOR FACING  
WRITE TODAY FOR COMPLETE DETAILS

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AVAILABLE



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COMBINED BORING & FACING TOOL HEADS

# Chandler-Duplex



are produced with ground and polished raceways and incorporate chrome alloy balls; they are available without shields, single shielded or double shielded.

### Norgren Micro-Fog lubricator

A new and unique Micro-Fog lubricator for bearings, spindles, gear boxes and small air powered devices has been announced by C. A. Norgren Co., Dept. BB, Englewood, Colo., pioneers in the development of airborne bearing lubrication for more than 20 years.

This new Norgren Micro-Fog lubricator is said to produce an extremely fine and uniform oil fog at low air flow. Features include: a constant oil level to assure a uniform rate of oil feed; 360° visibility of the oil flow; accurate metering of oil delivery into the air line to as little as 1 drop in 20 minutes by means of air control; universal right to left or left to right flow without adjustment; full view of the oil supply; cools as it lubricates high speed rotating parts; prevents entry of foreign particles into bearing and spindle housing,



gear boxes, etc.; greater oil fog travel; uniform distribution of oil fog to multiple outlets.

OVER 1500 NOW IN USE!

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WITH HYDRAULIC TABLE FEED  
AND ADDITIONAL HAND FEED

Where highest precision is required the ABA Precision Surface Grinder meets every test. With the aid of divided heads, sine plates, and other attachments it can handle the heaviest and most difficult jobs. Complete hydraulic table feed as well as manual operation make this grinder doubly practical. The use of ball bearings means extremely easy handling of all hand wheels and operating levers.

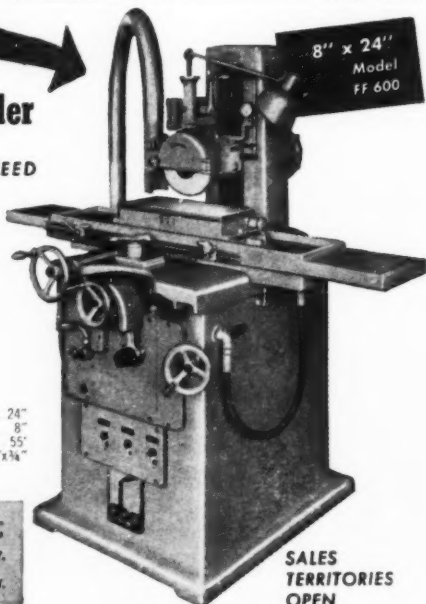
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- it files
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uses  
standard  
flexible  
shaft  
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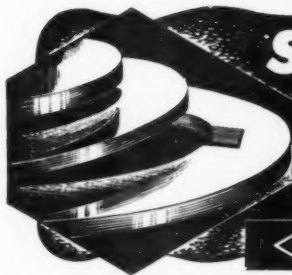
The Di-Profiler is a new multiple action tool that  
(1) Reciprocates (2) Oscillates and (3) Rotates  
when used with the spindle attachment. Stroke is  
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A perfect tool for smaller surfaces, intricate shapes,  
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Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erecting, and repair work.

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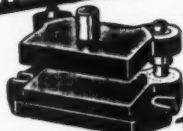
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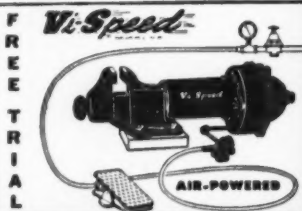
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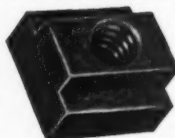
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**STAND MAGNIFIER**  
Handy stand magnifier with universal adjustments. Overall height 6". Has powerful, clear magnifying lens. **199**

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A time saver for precision checking. Magnetic base fits curved or flat surface. Has 45-50 lb. pull. Stainless steel 6 1/2" rod mounted in ball socket permits universal settings... **3.95**

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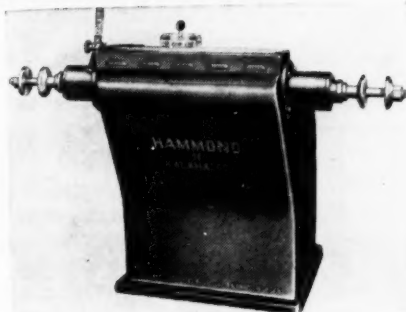
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WERE FORBIDDEN TO WORK AT NIGHT BECAUSE THE LIGHT, HEAT, SMOKE AND NOISE WHICH EMANATED FROM THEIR SHOPS KEPT THE NEIGHBORHOOD AWAKE!

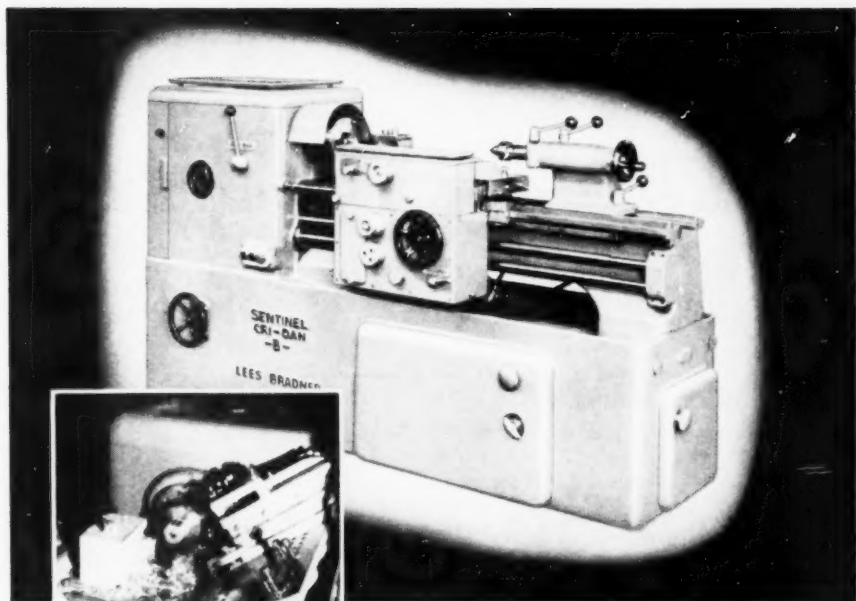


**BRITISH** WORKERS RESENTED THE AUTOMATIC GEAR-CUTTER WHEN IT WAS INTRODUCED INTO MANCHESTER, ENGLAND, FROM AMERICA . . . THEIR UNION PASSED A DECREE THAT A MAN MUST BE PLACED AT EVERY MACHINE.

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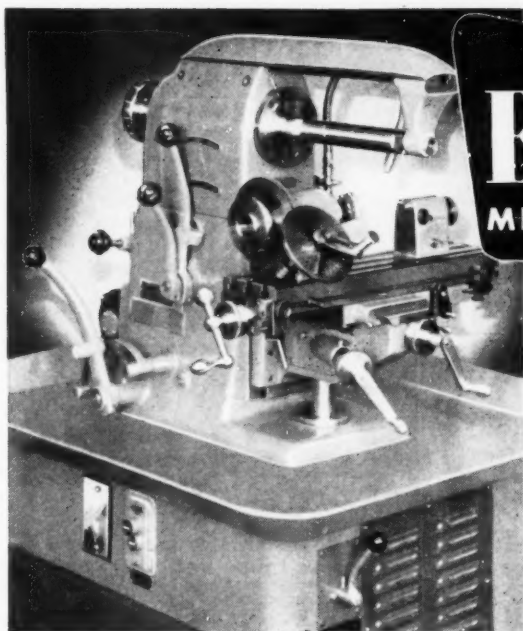
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### TOOL ROOM PRECISION WITH PRODUCTION SPEED

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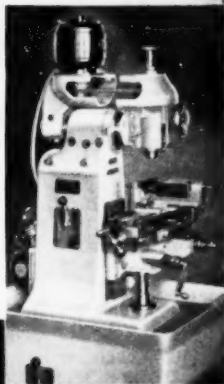
#### HORIZONTAL MILLING MACHINE

Spindle of nickel steel, hardened and ground externally and internally, and fitted with pre-loaded ball bearings. Speeds, 85 to 2750 R. P. M. with Variable Speed Drive, directly reversible. Table,  $4\frac{1}{8}$ " x 18" with longitudinal travel 12"; transverse, 6", vertical, 6". Two-speed motor,  $\frac{3}{4}$ - $\frac{3}{8}$  H. P.

Elgin Lathes and Milling Machines are standard equipment in many tool rooms and shops where extreme accuracy is necessary.

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Spindle is nickel steel, hardened and ground both externally and internally, and fitted with pre-loaded ball bearings. Five speeds, 200, 700, 1250, 2250 and 4000 R. P. M. Vertical travel of spindle,  $1\frac{3}{4}$ ". Table is  $4\frac{1}{8}$ " x 18" with 12" longitudinal travel; transverse travel 6". Vertical table travel 7". Head swivels 90° each side of center.



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1772 BERTEAU AVENUE

CHICAGO 13, ILLINOIS

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**YOUR INSURANCE POLICY  
AGAINST POWER WASTE**

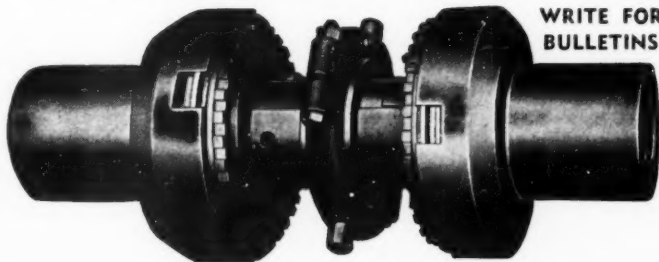
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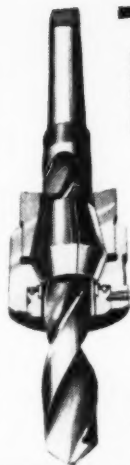
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Left: Cross section view of WOHLNIP Drill Stop applied to drill.



WOHLNIP Drill Stops are available for any size of number, letter or fractional drill and tool shanks.

## WOHLNIP

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Patent Pending



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Boxed set of 6 different size extractors including wrenches.



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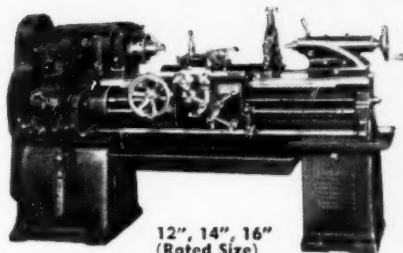
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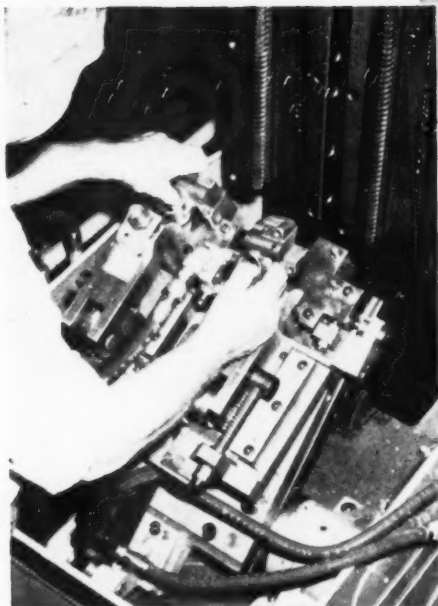
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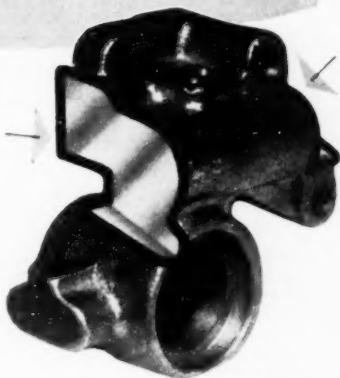


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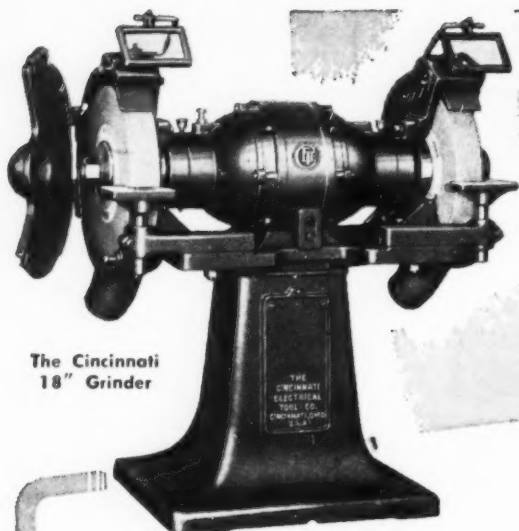
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Allen "pressur-formed" cap screws are standard stock items in sizes from No. 4 thru 1 in. Flat head cap screws, No. 4 thru 1/4 in. Both N. C. threads. Many sizes are also standard in stainless steel, or in Allenoy steel with N. F. threads.



## Three Reasons Why

- 1 Reduce set-up and change-over time required on large tapered shank tools.
- 2 Versatility—drilling, reaming and other operations can be done with same set-up, using Postiv-Lok adapters.
- 3 Eliminate need of integral tapered shanks. Tools cost less.

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